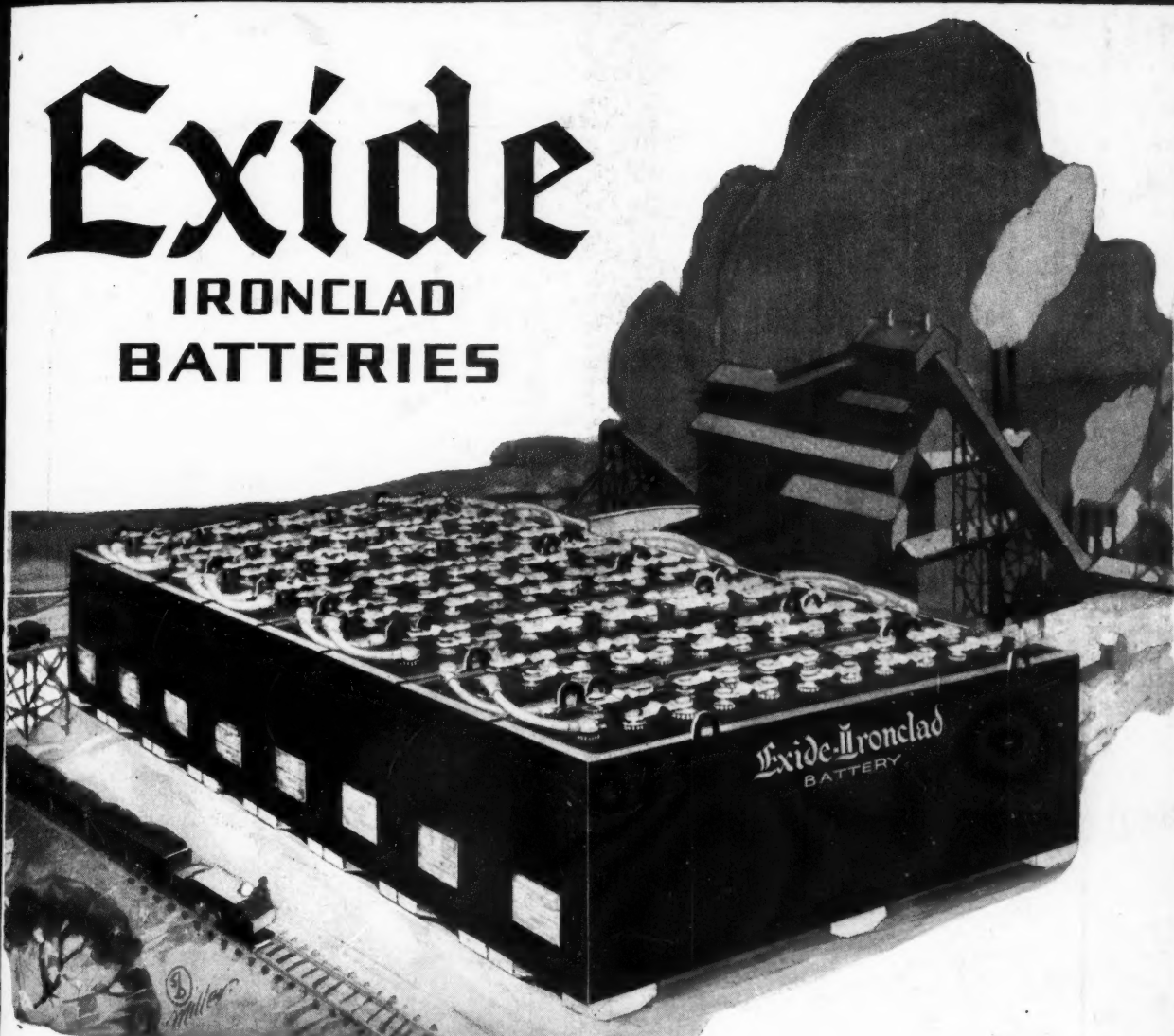


COAL AGE

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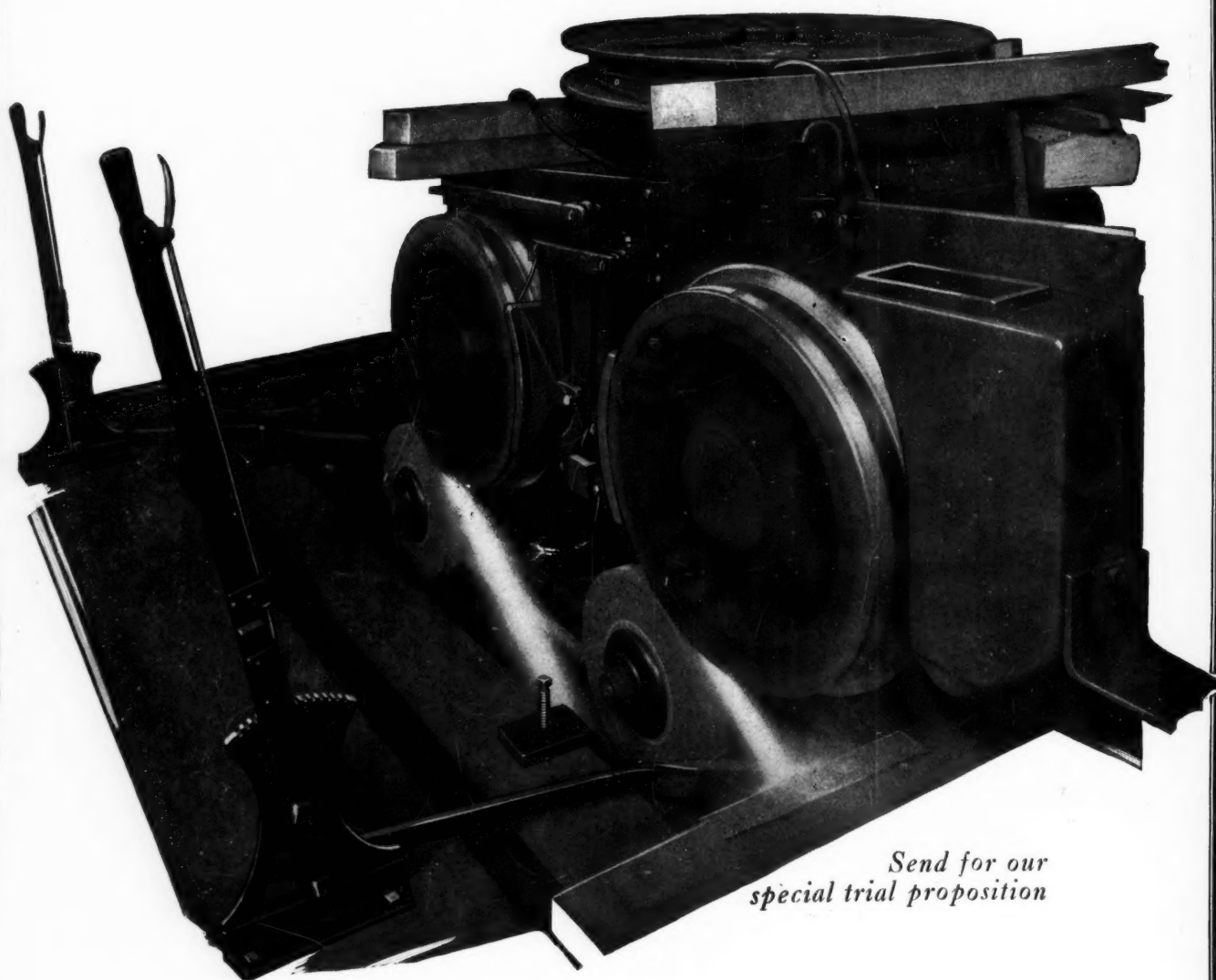


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COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER, Editor

Volume 23

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Number 9

Classification of Coal

NOTHING is more certain than that coal is a complex substance made of many forms of vegetal matter mixed with various kinds of ash-forming material. We cannot expect the "pure coal matter" from many beds or from the various strata of any one bed to be of the same specific gravity. Heavy coal may consist of heavy vegetal material and little ash. Light coal may be composed of light coal matter and more ash or an ash of low specific gravity, for the "ash" itself may vary in density. Coal resins, as witness those at Coalmont, B. C., may have a density of 1.03, whereas coaly matter is generally of much greater weight.

In view of these facts it might seem remarkable that coal can so readily in most cases be classified by gravimetric methods. Its weight usually is an indication of its degree of purity, but it may not always be so, and the assumption that it is so is not quite safe, as has been shown on Vancouver Island. Where classification by specific gravity of the seam or seams coming to a washery is not parallel to a classification by ash content, separation of good coal from bad cannot be left to the arbitration of gravity classifiers no matter how well they perform their tasks. They might be perfect in achieving what they attempt to do but fail utterly to do what they should do, namely, separate clean from dirty coal.

Most of our classifiers which operate on other physical qualities than specific gravity do their work somewhat imperfectly. Some rely on the rounded form of coal and the bedded form of slate. One, the flotation process, the possibilities of which are intriguing, depends on the surface tension of a mineral body like coal as compared with that of gangue like slate or sandstone. Here also are assumptions. To begin with, the pyrite which is found with coal is a mineral and disposed to float on a froth. However, it is heavier than coal and perhaps for other reasons is not as ready to float as is that mineral. At least, flotation experts tell us that coal floats more readily than pyrite. If so, this is well indeed. The industry will be pleased and surprised to see it sink, in some percentage at least, with the gangue.

Still we do not know that the selective action of a froth in contact with coal increases regularly with the purity of the mineral. Is the attraction of all pure coal substance equal and, even if it is, may not some ashy materials decrease that selective action more than others? To determine if this is so is perhaps a hopeless task at this stage of the art. The only way is to test coals to see which gives the best result. It is important, however, to remember that all classification proceeds on the doubtful premise that by grading the coal according to certain physical qualities we are classifying it according to its calorific value. In some cases it may be true, or true enough for practical purposes; in others it may be far from the truth. Let us in any event pro-

ceed with an open mind lest the operation be successful yet the patient die.

It must be remembered also that the flotation process depends on the most superficial of externals and in any particle of variable material external impurity will have more effect than impurity that is internal. Thus another variable is introduced, one that in gravimetric methods does not exist.

Publicity for Coal

PEOPLE like to read that which pleases them. They buy the newspaper that says the things they like to hear. They read the books that tell the story in the way they think it should be told. It is confirmation of their worst fears, their strongest likes and dislikes, that the average reader seeks. The public believes many strange and fearful things about coal—that the coal men are in combination to rob them, that dishonest and iniquitous practices prevail throughout the trade, that so many things are wrong with the whole business that "something" should be done to fix it up, that "the government should take a hand" in straightening out a snarl so complicated.

It is interesting to note how the newspapers help this warped understanding to grow. Some weeks ago there was much in the public prints to the effect that a strike in the soft-coal fields was imminent. The miners and operators met in New York to talk over the matter of an agreement to continue work after the present contract expired. The papers carried front-page headlines about the meeting that was to be and during its progress held the public in suspense as to its fearful outcome. Then when all was amicably settled and the strike cloud was dispelled for some fifteen months to come, did the public learn in the same front-page headlines that a great thing had been accomplished, that the thing which appeared doubtful was in fact to be, that there would be no strike? By no means, for the news that an agreement had been reached was buried well inside the sheets with inconspicuous headlines. Small wonder then that some do not know that the mines are working. Four months after resumption of mining, on Dec. 29, 1922, Henry W. Rose, general manager of the Republican National News Service, wrote to the chairman of the U. S. Coal Commission, saying: "The mines should reopen, and the men should go back to work."

It is a poor coal famine that does not freeze someone, so the papers carried front-page headlines on Feb. 19 telling the world that an aged woman, lacking coal, had perished from cold in northern New York. Later editions advised, with notable inconspicuousness, that she really had plenty of coal on the premises, but the correction will never overtake the headlined error. One victim at least will popularly be charged to the coal shortage of this winter.

Last week the United Mine Workers broadcasted a statement well calculated to inflame a near coalless

public. With all the care in the use of facts that marks the prospectus of a bogus oil promotion, this statement concludes that "the present monopoly organization of anthracite, through overcharges in each branch of the business, adds at least \$3.61 per ton, which is immediately discoverable, to the present price the consumer pays, and much more which cannot be exactly estimated." Such an opportunity for headlines could not be resisted by newspapers, as the authors of the statement well knew and calculated. The reply of the anthracite operators, calling attention to the fact that the U. S. Coal Commission is now engaged in an investigation designed to settle that important and controversial point, and suggesting that such assertions from the miners are but attempts to prejudice the case and mislead the public, was fortunate in getting publicity here and there as inside filler.

Now this is not mere caviling at the press. By all the modern tenets news is news when it is startling, novel, sensational. If the coal operators rob the people, that is news, but if they do not that is not news. If the miners go on strike, that is news, but if they do not strike, such is not news. Not all readers care for sensation; some desire plain facts. Thus we find different publications catering to a large number of different tastes.

Men in the coal trade have as wide a variety in taste for "news" as any other section of the public. Some read only that which pleases them, and, caring for warped news and peddled gossip, they have created a market for what, for want of a better designation, may be called coal-trade scandal. Such a one, either fearing the light of day on the facts of his business or considering lightly the task of the Coal Commission, indulges himself in a printed sheet advising and encouraging the belief that the best and surest way to ward off the consequences of national public dissatisfaction with the coal men is to tell the public to go to hell, that questionnaires are violations of constitutional rights of private business, that everyone in Washington save a very select few is secretly plotting to take over the coal and all other business.

On the one hand, headlining news when it makes coal out the scapegoat; on the other hand, gossip, some quite original, hawked for a consideration, attempting to make the public the scapegoat. There is mightily little distinction in the doing or the believing between the two.

How Many Cars Should a Mine Get?

ALTHOUGH tastes may and do differ as to method, the purpose of all plans for coal-car distribution is to furnish equitable division of the means of getting coal to market. It really matters little whether the rating by which the cars are apportioned is inflated, provided the inflation as between the mines on a given railroad is uniform, for the figure purporting to represent the capacity to load is but a ratio, an abstract figure. Simple as it may appear to be to determine such ratios and to apply them in practice, the difficulties are great.

Prior to the war every road had its own method, and it is to revert to this condition after five years' of trial of uniform rules, known as CS31, that present effort is being directed.

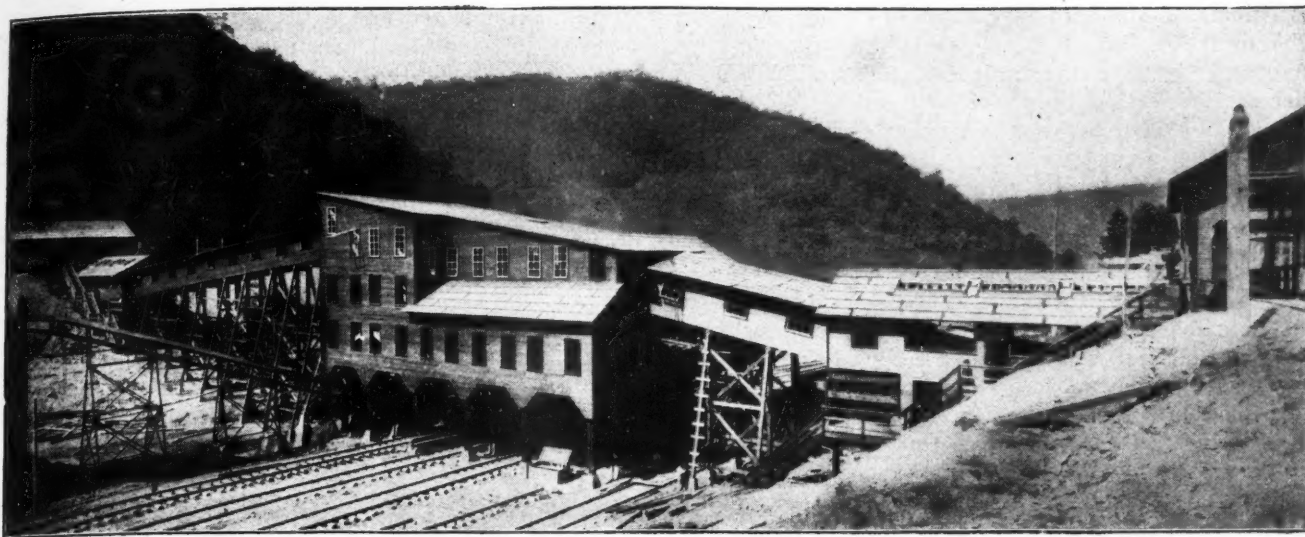
There is a plain need in many a coal-mining field for a correction in the number of cars each mine may order in a day. Abuses under CS31 have made rank over-

rating altogether too easy. Everybody admits it. Fortunately it is to be hoped that the new methods of rating mines about to be adopted in some of the Eastern fields will have a salutary effect for the benefit of the whole industry. But the fact that both carriers and operators in those fields may agree upon the fairness and success of any method for their own use does not prove that the same method should work everywhere in the United States. Where the grip of unionism is as strong as it is in Illinois and Indiana and where slope and drift mines are so few, the limited time of each working day and the limited storage capacity for loaded pit cars at each operation put the unionized shaft mines in a class requiring separate treatment.

The Illinois Central and Chicago, Burlington & Quincy railroads wish to create a railroad board for each line to fix arbitrarily the car rating of each mine, after considering various factors, following after the Chesapeake & Ohio and the Norfolk & Western plans. They cannot be blamed for wishing to take into their own hands the vexing question. Too many wiles have been practiced. Something is the matter when the mines of a single railroad system are rated at 6,400 cars a day, based on the mine operators' reports, and when 4,400 cars stands as the maximum ever ordered in any one day and 2,500 cars is the average loaded out! Something certainly needs correcting in a car-rating system when it is freely admitted by operators, as it was recently in a Chicago conference of mine men and railroaders, that the mine reports of hours worked are deliberately falsified and that double sets of records are sometimes kept! Who can blame the railroads for growing weary of it?

Under CS31, now in effect, mine ratings for each month are determined upon the number of hours worked and cars loaded under the tippie during the preceding month. There is no better and fairer basis providing the data are correct. The railroads have taken the mining companies' reports on the hours worked. They say they could do nothing else. It would have cost too much. And in cases where they have declined to accept a mine report and have reduced a mine's car rating, they have drawn harrassing and expensive lawsuits. It is easy to say that CS31 is adequate and requires only that the railroads police the reports to make it equitable and successful. It must be admitted that policing has its difficulties. The policing should not be required of the railroads alone. Mine operators themselves should assume a large responsibility and, having done their part, they should suffer in their car rating no stint from the carriers or any other source.

The compromise plan suggested by Illinois and Indiana that the preceding month's production basis be retained and that a railroad board examine any mine suspected of falsifying reports of time worked has its possibilities. Its penalty clause, empowering the board to run a three-day test in case of disagreement with the mine owner and to dock him in subsequent car supply to the extent to which he benefited by padding his report, is a real weapon in the railroads' hands, poor a device as is such a test would be. The suggestion should be seriously considered. It certainly would cost the railroads something to maintain such a board, but if they intend, under their own proposed plan, to make an adequate study of each mine's condition in order to arrive at a proper rating, then the compromise plan would be no more expensive than their own; it probably would be less costly.



Betsy Layne Mine Presents Unusual and Suggestive Methods of Construction and Operation

Dump Houses Separate from Tipple Structure—Belt Conveyors to Commercial Screens—Preliminary Screening Protects Belt by Putting Slack Under Lump—Well-Equipped Isolated Power Plant—Roof Gunned and Stoppings of Concrete

BY F. R. MORRIS*
Betsy Layne, Ky.

ONE of the most recent of the large modernly equipped coal plants to be opened up in the eastern Kentucky field is the Betsy Layne mine of the Pike Floyd Coal Co., a subsidiary of the Pittsburgh Coal Co. The mine lies on a two-mile spur from the tracks of the Chesapeake & Ohio R.R., in Floyd County, seven miles northwest of Pikeville, Ky. In few places in this field is construction of so permanent a character or the mechanical detail carried to such a degree of refinement.

This property, comprising approximately 2,000 acres, lies on the east side of the Big Sandy River. Of this area, 1,400 acres is underlaid by two seams of coal of commercial value. These are known as the "Elkhorn" beds, no satisfactory correlation having been made between these measures and the coals of West Virginia and of other bituminous fields. In many respects, nevertheless, they correspond to the Kanawha River series.

These two measures are separated by a short interval, 40 to 70 ft. thick. They lie not far from water level. Consequently the coal area is not cut up by ravines into narrow fingers but is of such a shape that a regular system of mining can be adopted. The hills in this locality are broad and gently rounded, which accounts for the occurrence of a large unbroken tract of coal in a field where most of the bodies of coal are of such a shape that a simple mine layout is impossible.

The upper, or No. 3, seam, which is the one now being mined, has an average thickness of 5½ ft., as determined

by careful drilling and prospecting made when the property was acquired. It is a high-volatile coal similar to those from the No. 2 Gas and Pond Creek seams of West Virginia, though lower in sulphur content and suitable for byproduct coking. The coal is fairly hard and stands preparation well.

The presence of two partings in the coal, the thickness of each averaging 3 in., makes mining difficult; these partings occur 15 in. and 36 in. respectively from the bottom. They are of hard blue shale and, though not difficult to remove from the coal, must be broken by a charge of explosive. This greatly increases the percentage of fine coal obtained. In some cases the top is a hard, evenly bedded shale; in others, and especially near the outcrop, it is soft and laminated with coal, which is unevenly bedded and filled with fossils.

The location of the property on the east side of the river made it necessary to construct a bridge and build

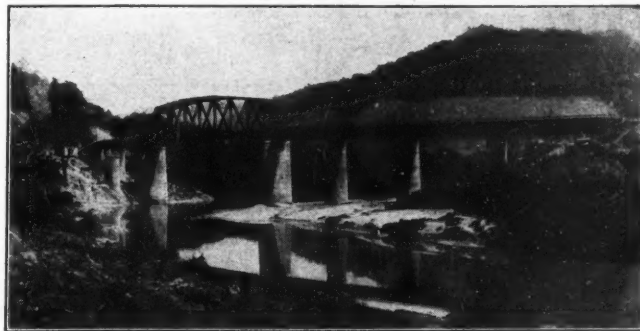


FIG. 1—RAILROAD BRIDGE CONSTRUCTED TO MINE

*Resident Engineer, Pike Floyd Coal Co.
NOTE—The headpiece of this article illustrates the Betsy Layne tipple of the Pike Floyd Coal Co., Betsy Layne, Ky. No cars pass over any part of the trestle structure, nor is the trestle subjected to dumping strains. Note how firmly planted on the hillside is the dumphouse on the right and also how satisfactorily the belt conveyors lift the coal from a point below true tipple height to the elevation required. This plant is planned to dump 5,000 tons in a day. Note on the left the housing of the flight conveyor. This conveyor carries coal to the boiler room.

Our railroad work has passed the stage of wood. In the most remote sections of the country, railroad bridges, even when made for temporary use, are built on stone or concrete foundations and constructed of steel. But reasons seem always ready at hand for justifying the use of wood in mine structures. Is it really reason or merely habit?

employed to clean the coal thoroughly before it reaches the center of the tippie, in the event that it is to be loaded as run-of-mine, or to give it a preliminary cleaning before it reaches the screens and picking tables above the railroad tracks in case sized coal is to be loaded. Above the picking table in the dumphouse is a scraper conveyor which discharges the refuse into a 25-ton wooden bin under which a mine track has been laid. Mine cars are spotted under the bin, and when loaded are hauled to a horn dump on the slate pile.

The conveyors which carry the coal from the dumphouse to the tippie proper are made up of six-ply rubber-composition belting 42 in. wide. When delivering their full capacity of 300 tons per hour each they run at a speed of 225 ft. per minute. The power cost of driving these conveyors is low. A 30-hp. motor drives each

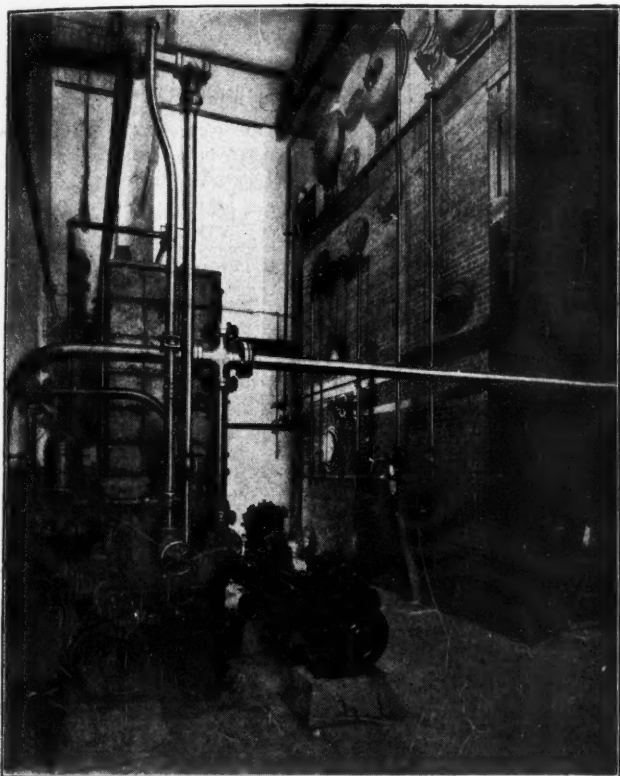


FIG. 3—FEED-WATER HEATER AND STIRLING BOILERS

The Betsy Layne boiler house is equipped with two 270-hp. boilers, operating under a pressure of 300 lb. per square inch. The water for these boilers comes from the Big Sandy River, which is four-fifths of a mile away. It is delivered to the power plant by centrifugal pumps located in a submerged pumphouse.

belt. They are about 200 ft. long between centers and operate on a 7-deg. slope against the load. They require no attention other than the oiling of the idlers and pulleys. This is done by a man who looks after the operation of all tippie machinery and is responsible for its proper performance.

Leaving the belt the coal goes into a pocket, from which it may be diverted by a system of flygates to either of the screening rigs or to the run-of-mine chute, which leads directly to the railroad car. The fines are diverted and run back to be loaded into railroad cars through the run-of-mine chute. The egg and lump sizes go from the screens to loading booms having a 27-ft. table on the tippie deck for any further cleaning that is necessary. The distribution of the sizes and the combinations that may be obtained are best indicated by referring to Fig. 2.

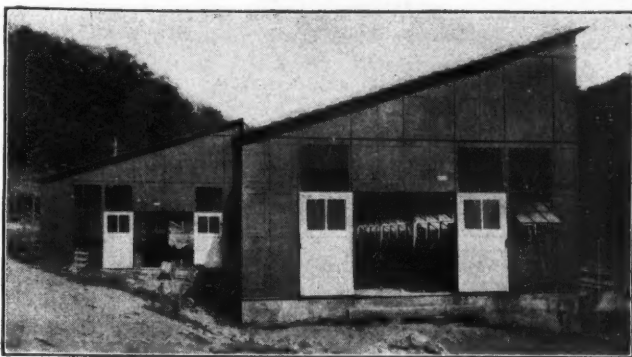


FIG. 4—REPAIR HOUSE IS BUILT OF STEEL

Too many of the repair shops around mines are constructed of wood with a few small inadequate window lights. The form of building here illustrated is substantial, inexpensive and fire-proof and adapts itself readily to adequate lighting. The main building houses the carpenter and blacksmith shops and the annex the electrical-repair shop.

The method by which power is distributed and the motors controlled in this tippie is of special interest. The main feeder leading from the power house comes to a panel at a central location. From this board independent circuits are carried to each motor, and switches and fuses for these circuits are mounted on the main switchboard. With such an installation it is unnecessary to stop the entire tippie should trouble occur on any one circuit. All motors are operated with automatic starters having remote control and may be started or stopped from the trimmers' platform. A system of pushbutton alarm signals also keeps the men on the trimmers' platform in touch with the dumphouse. This system provides a flexible control and eliminates the employment of men who otherwise would be required to look after the operation of motors.

Because the tippie is constructed of wood some adequate means of fire protection is imperative. The problem is solved by placing a 4-in. main up the center of the tippie from the boiler-feed pumps. From this main 2½-in. branch lines are taken to hose connections so distributed that any point of the structure can be reached. The tippie was erected and furnished by the Webster Mfg. Co., of Chicago, Ill.

Two 300-kw. units driven by Ball and Skinner engines generate a 275-volt direct current which is used throughout the operation for light and power. The generators were designed for 575 volts, but the armatures were

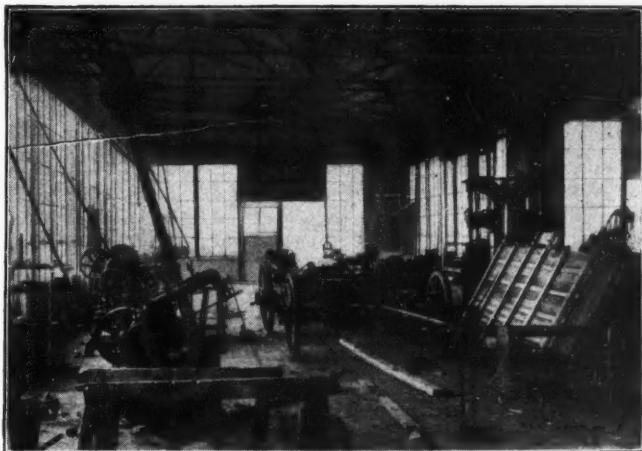


FIG. 5—UNUSUALLY WELL-LIGHTED REPAIR SHOP

Quite in contrast with the dingy workshop at the average coal mine but wholly in keeping with modern factory-building practice in the matter of lighting is the repair shop of the Betsy Layne mine.

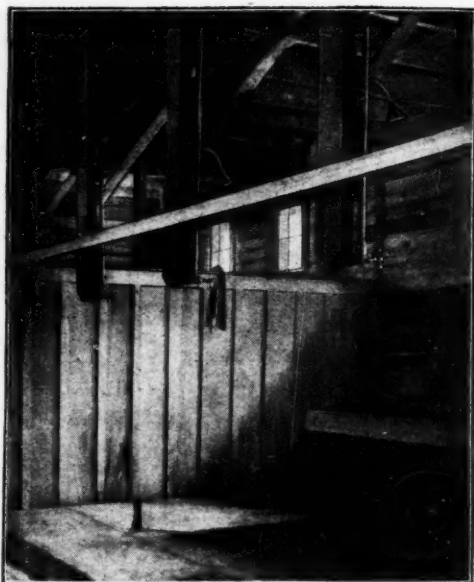


FIG. 6—BATHHOUSE WITH SHOWERS

This building is supplied with heated air. The clothes are not suspended from the roof but are kept in lockers. The floor is of concrete as also is the wash trough. In this building are ten showers and thirty-two wash faucets.

rewound for 275 volts and the fields reconnected in multiple.

The original intention was to equip this plant with turbine units, and the boiler equipment was put in with this idea in mind. The installation is provided with two Stirling-type boilers each of 270 hp. The boiler pressure is 300 lb. per square inch. The feed-water piping is so arranged that either of the two pumps which are installed can supply hot or cold water to the fire line on the tippie.

Feed water is obtained from the Big Sandy River, which lies at a distance of 4,200 ft. It is pumped by two De Laval double-stage centrifugal pumps located in a concrete dry well at the river bank. These deliver

water to a 60,000-gallon steel tank at the power house which is elevated on steel legs 40 ft. above ground level. The pumps each have a capacity of 125 gallons per minute, work against a discharge head of approximately 145 ft. and are driven by 20-hp. motors equipped with remote control starters which can be operated from a switch panel in the power house.

PUMP ROOM SET BELOW LEVEL OF WATER SUPPLY

In order to have the pumps properly primed at all times they are set below the level of the water in the river. Thus installed the well would be flooded should the pumps leak. To guard against this contingency a float switch is installed in a small sump within the well. Then if the water rises to a certain height the switch closes an independent circuit which passes through a lamp on the switchboard in the power house. When by reason of the current the lamp is ignited the engineer is warned and the pump can be shut down and repaired before serious damage is done.

The coal supplied to the power house is dropped from the tippie by means of a chute coming from under the 1½-in. screen. It is then transported by a small flight-conveyor to two 25-ton cylindrical hoppers in the boiler room. The boilers are fired by hand.

The switchboard in the generator room has eleven separate panels which give the following independent circuits: trolley, machine-feeder, fan, tippie, river pumps, street lights and house lights. Each panel is equipped with ammeters and automatic circuit breakers; the generator panels also have voltmeters and an under-voltage release.

Though the first cost of such a system of distribution is high, much is saved by the early detection and localizing of short-circuits, especially when the plant is of the size of that herein described. The system is further carried out in the mine by sectionalizing all branch feed-

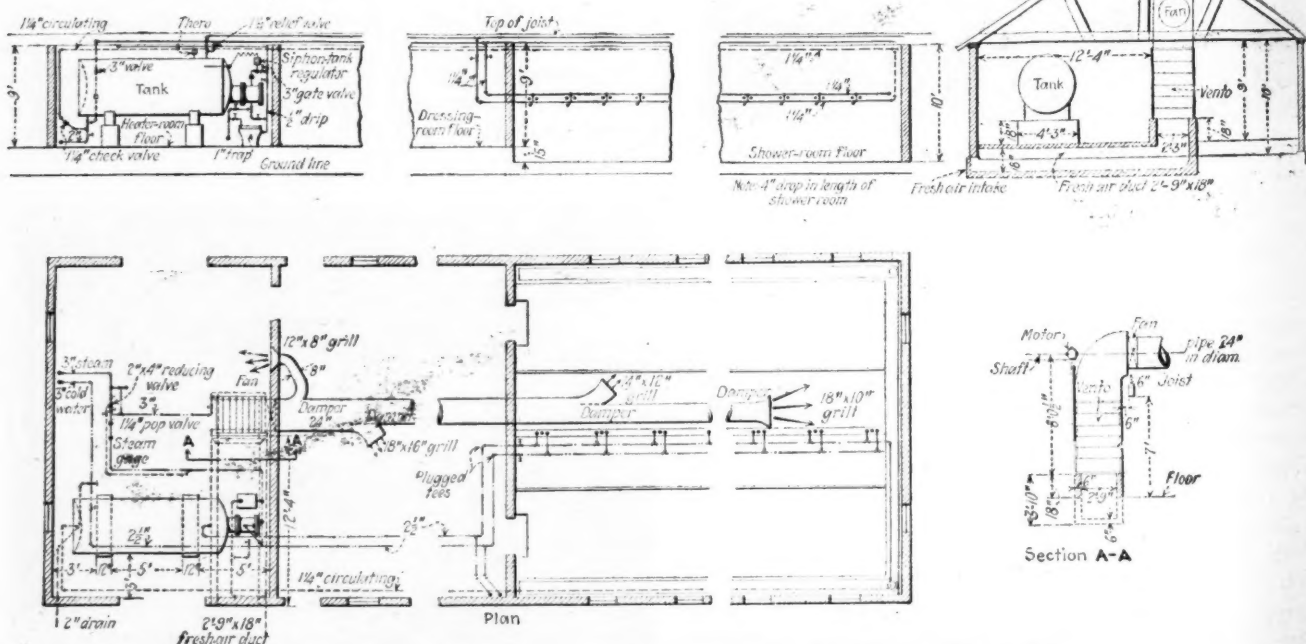


FIG. 7—SYSTEM OF HEATING OF BATHHOUSE AT BETSY LAYNE, KY.

An air intake under the floor measuring 33 x 13 in. encircles coils filled with exhaust steam from the power house. This heats the ventilating current. The warm air is then forced into an overhead air

duct which discharges into the locker or shower rooms. Thus the bathhouse is under a pressure of air, and when the doors are opened the air tends to escape, whereas in most bathhouses the air enters in copious

measure whenever the doors are opened, that being inevitable where the air in the bathhouse is at a lower pressure than that outside. No cry is more frequent around a bathhouse than "keep that door closed."

ers and trolley circuits. In carrying direct current at this voltage over the distance required at this operation the system of distribution just mentioned is aided by the proper suspension of lines and efficient bonding, which aid in insuring continuity of service. Particular attention is paid to return lines, negative lines of 750,000 c.m. cross section being carried to the generators from a point in the mine track not far distant from the drift mouth.

The building which houses the machine, electrical-repair, carpenter and blacksmith shops is shown in Fig. 4. It is a standard Truscon steel-and-glass structure of saw-tooth design. The merits of this type of building are its low first cost and the short time required for erection; this particular building was completed in less than two weeks. It is fireproof and the large area of sash assures an abundance of light. Because of the isolated location of this plant the shop is prepared to take care of all electrical and mechanical repairs. The machinery is driven by one electrically-driven line shaft and all belts are protected by wooden guards.

The bathhouse is a frame building which is heated by a Vento heater utilizing the exhaust steam from the power house. As indicated in Fig. 7, an air intake under the floor encircles the steam coils, which thereby heat the air by which the building is ventilated. The dry warm air is then drawn into an overhead air duct which discharges into the locker and shower rooms.

Fig. 8 is a map of the territory surrounding the mine plant on which are shown the buildings and the mine

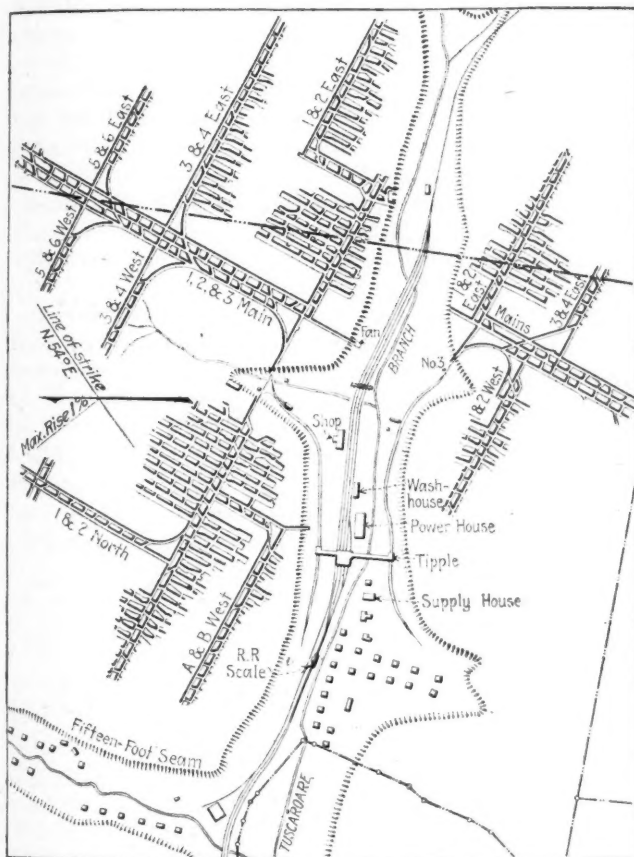


FIG. 8—MINING PLAN AND SURFACE LAYOUT

Not all the houses are shown, two small groups being at the head of Tuscarora branch, one up each fork. The long easy curves of 200-ft. radius used at this mine for underground roadways are much in evidence. Unfortunately, the fossiliferous roof is too weak to hold up over the places in the headings where such long curves fork and in future the curves in the outgoing tracks will be made shorter, evidences of that intention being seen in the more remote workings of the mine.



FIG. 9—WELL TRIMMED TWELVE-FOOT ROADWAY WITH HALF-INCH GUNITE COATING ON ROOF

Gunite not only covers the roof but is carried down the coal rib as shown. Of all roofs few are more trying than one filled with coal and especially fossil ferns. This roof is of that character. The cemented roof not only does not fall but keeps up the trolley wire. When the number of fires resulting from fallen trolley and other electric wires is considered the advantage of such guniting becomes the more evident. A little work of this kind may be looked upon as insurance against electric fires. It also reduces the hazard consequent on the use of timber for mine supports and serves to make the illumination of the roadways more effective.

layout. The tentative system of development may be changed at a later date if conditions warrant a change. As already stated, the roof of these mines is a blue shale, full of fossils and laminated with coal. This top is readily slacked by the air current, and for this reason the practice of driving double-track rooms, 30 ft. in width, was abandoned in favor of the 25-ft. single-track room shown in the illustration.

This top also prohibited driving curves of 200-ft. radius at the mouth of each butt, which was the practice first adopted. With a curve of this length the unsupported span was too wide at the point where the entries diverge, and the increased efficiency in the haulage was not sufficient to justify the expenditure for elaborate steel timbering.

To overcome these difficulties with the mine roof a cement gun was installed, and gunite is used on all main haulageways and entries wherever they are not subject to excessive weight such as will bring down the roof. On some of the entries the gunite has been in place more than four months and has so far checked cutting and weathering actions. In this case it is cheaper in first cost than timber and it saves maintenance charges by preventing the scaling and spawling of rock and the expense entailed in cleaning up the roadways thus encumbered. Furthermore, the trolley wire no longer comes down. The coating applied is about $\frac{1}{2}$ in. thick and costs approximately 80c. per linear foot in a 12-ft. entry. The type of stopping used on all permanent entries is constructed of 8x8x20 in. concrete blocks laid up in cement mortar, as shown in Fig. 10. The sides are hitched into the ribs and plastered. Gunite is used to seal the top and sides. This coating is extended if necessary from 12 to 18 in. each way from the edges of the stopping. This eliminates the possibility of small leaks.

CONCRETE STOPPING BLOCKS MADE AT MINE

The concrete blocks are made at the plant by day laborers who use a machine designed to facilitate their construction, and thus far the only aggregate used has been the fine coal recovered from the stockpiles which accumulated when the mines were first opened. These blocks were given thorough tests to determine whether the coal aggregate would lower their fire-resistance. It was discovered as a result of these experiments that the



FIG. 10—CEMENT-BLOCK STOPPING WITH GUNITE EDGES

Though the Betsy Layne mine is just starting, it is not handicapped by poor stoppings which will leak and soon rot and have to be replaced by something tighter and more permanent. The weak point in most stoppings is around the edges. Even a cement stopping may fail here. With gunite, not only are the cracks between the stopping and the roof and sides calked but the natural or developed cracks through the roof and the pillars can be entirely shut off if the gunite is carried far enough.

blocks in which coal had been used in place of gravel would resist fire as readily as if gravel were used.

Each mine is ventilated by a 3x8-ft. centrifugal fan which is rated at 120,000 cu.ft. against a 3-in. water gage. It is driven by a 35-hp. motor equipped with a remote-control starter and a field rheostat which is used at present to reduce the speed into keeping with the limited area of the workings. This rheostat is mounted on a panel which also has an automatic circuit breaker and an undervoltage release. The fan is equipped with explosion doors and is housed in a brick and concrete building.

The coal is undercut by shortwall machines and the haulage equipment consists of 4-ton cable-reel gathering locomotives and 13-ton haulage locomotives. The mine cars are of 2½-ton capacity and are equipped with roller bearings. All main haulroads are laid with 40-lb. and the butt entries and rooms with 20-lb. steel. No. 5 turnouts with cast frogs are used for main-haulage roads and No. 3 turnouts have been adopted as standard for rooms and secondary haulageways.

At this time development has not progressed far enough to connect the North and South mines underground. In order to get machinery and equipment from the South mine for repairs and to permit the refuse from both mines to be handled over one dump, the outside tramroads on each side are connected by a steel



FIG. 11—MINE SHOWING STEEL CONNECTING TRESTLE

As the North and South mines are not yet connected and as any connection will be quite roundabout a steel trestle has been built connecting the mines, making it possible to take cars, locomotives, mining machines and other equipment to the repair shop and to discharge all refuse over one dump.

trestle which crosses over the railroad tracks. This trestle is designed for a load of 50,000 lb. and carries a walkway in addition to the track. The bents of the trestle are constructed of 12-in. I-beams set on a batter. They are spaced on 20-ft. centers though there is one span of 30 ft. The bents are tied together with angle-irons. The deck is composed of 18-in. I-beams with diagonal bracing and struts. The trestle floor is supported over the 30-ft. interval by 20-in. I-beams.

The management aimed to have the mechanical and electrical equipment complete in every detail and to install this equipment in such a manner that the expense for upkeep and repairs would be a minimum. As far as is possible under the conditions to be met the surface plant has been concentrated so as to simplify the problem of supervision and to eliminate all needless expense in the hauling of coal and the handling of supplies. By careful development and a concentration of the mine workings the mine equipment can be made to operate with maximum efficiency, thereby furnishing a large tonnage at a low cost.

Manufactured Fuel Valued at \$3,178,000

Produced in 1921 by 14 Plants

THE value of products of establishments engaged primarily in the manufacture of fuel, according to reports made to the Bureau of the Census, the Department of Commerce announces, amounted to \$3,178,000 in 1921, as compared with \$1,974,000 in 1919, and \$863,000 in 1914, an increase of 61 per cent from 1919 to 1921, and of 268.2 per cent for the seven-year period 1914 to 1921. The industry includes establishments engaged in the manufacture of briquets from bituminous coal and anthracite dust mixed with tar and pitch as a binder; a composition of charcoal, pitch, tar and soda; also fuels made of crude oil and sawdust, etc. Of the 14 establishments reporting in 1921, 2 each were located in Indiana, New York, Pennsylvania, Virginia and Wisconsin, and 1 each in California, Missouri, New Jersey and Washington.

In January, the month of maximum employment, 440 wage earners were reported, and in April, the month of minimum employment, 284, the minimum representing 64.5 per cent of the maximum. The average number employed during 1921 was 371 as compared with 171 in 1919. The statistics for 1921, 1919 and 1914 are summarized in the following statement; the figures for 1921 are preliminary and subject to such change and correction as may be found necessary from a further examination of the original reports:

	1921	1919	1914
Number of establishments.....	14	11	14
Persons engaged.....	464	228	174
Proprietors and firm members.....	3	.....	4
Salaried employees.....	90	57	29
Wage earners (average number).....	371	171	141
Salaries and wages.....	\$721,000	\$356,000	\$143,000
Salaries.....	237,000	134,000	31,000
Wages.....	484,000	222,000	112,000
Cost of materials.....	2,280,000	1,386,000	609,000
Value of products.....	3,178,000	1,974,000	863,000
Value added by manufacture ¹	898,000	588,000	254,000

¹ Value of products less cost of materials.

IN CO-OPERATION WITH the Combustion Engineering Corporation, tests are to be conducted by the U. S. Bureau of Mines at the River Rouge plant of the Ford Motor Co. on the largest boilers so far constructed. These tests will supplement the knowledge gained in previous tests on differently designed boilers when heated by powdered coal.

Blowouts in Belgian Coal Seams and the Way in Which These and Like Phenomena May Be Explained

Seams Which Sing and "Walk"—Morin's Theory of Expansion of Coal—Preliminary Warnings—Bumps, Vibrations and Breaking of Timbers—First and Second Winds—Grappe Blowout and Explosion—Ruelle's Polymerization Theory

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THERE may be much that is not novel in the following article, but it contains also a few facts that are not as generally known as they should be. I mean especially L. Morin's theory of seam expansion and H. Ruelle's hypothesis of methane polymerization.

Morin is a Frenchman; Ruelle is a Belgian. The former is chief engineer for the Lievin Coal Mining Co., of France; the latter occupies the same position with the Houssu division of the Ressaix Coal Co., of Belgium. In those countries, where only duly qualified mining engineers are employed in any position of responsibility in or around mines, the chief engineer always is the operating manager, having full charge of everything except the sales department.

With both Morin and Ruelle blowouts are a matter of hourly concern, their respective mines experiencing in the course of the year scores of such manifestations. The precautions which rendered the mining of other seams that were subject to blowouts comparatively safe failed so completely to protect the miners in the Houssu mines of the Ressaix Coal Co. that for many years these workings could not be operated. As a result of Morin's investigations new safety measures have been put in force which make the working of these abandoned seams reasonably safe.

It is due to such men as Ruelle and Morin, who have spent their whole business life in daily contact with the operation of seams of this kind, studying their frequent manifestations under their different aspects and applying continuously new preventive measures based on knowledge thus gained day by day, that it is now possible to mine, with profit and little loss of life, coal beds that only a few years ago were shunned by even the most enterprising and daring of coal-mining men.

BELGIANS DRIVE TUNNELS FROM HOISTING SHAFT

In Belgium, where the coal measures pitch at all kinds of angles (see illustration), the coal seams are entered through tunnels driven from the hoisting shaft. These tunnels are excavated across the strata on an upgrade such as will insure drainage and facilitate the haulage of loaded cars. The Belgian terms such a tunnel a *bouveau*.

We will suppose that a *bouveau* is being driven through the measures to top beds which are subject to blowouts, these beds being found only in the deeper measures at the base of the coal-bearing formation. On such a *bouveau* reaching a seam, the gas in the latter—that is, the methane it contains—begins to issue from the coal with a rustling noise called the "song of the seam" (*le chant de la veine*). As the *bouveau* drives through the seam, the latter, becoming freer and freer, immediately starts to expand into the empty space thus afforded.

The coal thereby loses some of its cohesion and lustrous appearance, the movement and the release of pressure modifying the condition of the coal from a depth varying from less than an inch to possibly 2 ft., depending on whether the seam is hard or soft, but without any regard to the quantity of gas per cubic foot of coal that the seam may contain. Two seams may be equally gaseous, but while the harder one will perhaps be altered to a depth of less than an inch, the softer one will soften and discolor for a depth of perhaps 2 ft. all around the opening which the *bouveau* makes in the seam. But no matter how deeply or how shallowly the coal may be affected, if the softened coal be dug out, the alteration in both color and cohesion will progress further into the solid.

Soon after the *bouveau* reaches the far side of the seam the latter ceases to expand. The cessation of expansion always coincides with a marked decrease in the emission of gas. The seam does not cease to emit gas, however, until some time thereafter. The period of time during which the emission continues at the abated rate is short where the seam is hard and difficult to mine. It is much longer when the seam is soft and is dug with ease, this, despite the fact that both seams may be equally gaseous—that is, contain the same amount of gas per cubic foot of coal.

EXPANSION CONTINUES AS LONG AS FACE IS WORKED

In regular mining operations, the same results are obtained. The only difference is that they take place on a much larger scale, in proportion to the development of the workings and the rate at which the faces are driven. It may be said that the expansion of the seam never ceases so long as the faces continue to be worked. The expansion of the coal bed when intersected by a *bouveau* is almost inappreciable in linear extent, but it becomes plainly visible in regular workings, where whole longwall faces may sometimes be found in the morning to have advanced—that is, expanded—several inches over night. On noticing this when they come to work in the morning, the men say: "the seam has walked" (*la veine a marché*).

When workings for any reason are stopped for a sufficient length of time, there is at first no marked decrease of gas emission, and there is none until the expansion has run its course. In the case of extensive workings this may take weeks if the seam is a soft one. After expansion ceases, gas, especially in the case of a soft seam, may continue to issue from the workings, but at a reduced and continuously decreasing rate.

The seam often expands suddenly. When it does, a rumbling sound like that of underground thunder makes itself heard. This sound is always accompanied by a concussion, plainly felt in the coal and adjoining strata. Simultaneously the coal is loosened at the face. Clouds

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of dust obscure the lights. The timbers suffer considerably from crushing. If one happens to lean against the coal or has his hand on the roof above, he feels a distinct shock, as he does under his feet. Extraordinary quantities of gas flood the return airways. The latter fact does not permit us to doubt that a close relationship exists between a sudden expansion and an extraordinary gas emission.

Until about ten years ago the majority of Belgian and French mining men were of the opinion that what has since come to be called seam expansion resulted from the action of high-pressure gas forcing its way in great abundance through the coal. This idea has gradually ceased to prevail since Morin published the result of his extensive research work concerning the effects of pressure on deep coal deposits. (See *Bulletin de l'Industrie Minière*, Paris, December, 1912.)

FIRM COAL EMITS GAS READILY

It is a fact that in all cases where a uniformly gaseous seam contains zones of easily mined coal and others where the coal is hard, the coal of the firm description always emits its gas readily, none or practically none of it being found in the mined product reaching daylight. Not so with the other kind of coal; it retains its gas so tightly that days, weeks and even months may pass before it sheds the last of it. If, however, the latter coal be submitted to crushing, the gas it retains so tightly is emitted. It all comes out promptly if the grinding is sufficiently thorough.

This Morin proved. He took 4 kg. of hard, gaseous, freshly mined coal and submitted it to three successive grindings each of two hours' duration. During the first grinding, the coal emitted 13.683 liters of methane. The second and third operations yielded 2.302 liters and 1.660 liters, respectively, of the same gas. The total gas collected was 17.645 liters, making 4.410 liters per kilogram of coal. This is equivalent to 122 cu.in. of gas per pound of coal. Or, putting it otherwise, every cubic inch of that coal yielded practically 6 cu.in. of methane.

Easily mined coal, which is coal lacking in cohesion, is really crushed or expanded coal. Consequently Morin's tests indicate that coal must be expanded to cause it to yield its gas promptly. Hence the theory that the emission of gas causes expansion is no longer defensible.

GAS POCKETS ARE A MYTH

Another ancient theory, the oldest of them all, I think, that gas stored under pressure in underground pockets is the cause of what is now known as seam expansion, was discarded long ago. No such pockets have ever been found, and none of the hundreds of blowouts that have occurred in Belgium has ever disclosed empty spaces larger than could be accounted for by the quantity of solid material which is ejected with the gas.

Sudden expansion and its accompaniment of underground thunder and timber crushing are far from being unknown in non-gaseous seams. But, beyond material damage and scaring timid souls, they do no harm. In seams subject to blowouts, sudden expansion always is an ominous sign, for it may be the beginning of a disastrous, death-dealing gas outburst. The subterranean noise, the breaking of the timbers, the jolt the men get from the strata, are a signal for everybody to seek safety by the shortest possible route.

Of the hundreds of blowouts concerning which survivors have been able to give detailed and reliable evidence, there is no record of a single one having failed

to announce its imminence in the same way. Many are the men who, having gone several times through the same kind of experience, can remain sufficiently cool in the presence of danger to notice and remember what takes place. The cracking of the timbers has never failed to be reported as being simultaneous with the underground thunder. Scores of men have reported seeing the faces advance bodily toward them. Several have compared the coal thus moving to coke issuing from a byproduct oven, a natural comparison for men to make who, in many cases have to cross coke yards in going to and from work.

When a blowout occurs it follows the sudden expansion of the seam by only a few seconds. But, short as may be the notice given, it has saved thousands of lives in those Belgian collieries classed by that country's Department of Mines as being of the "third category." In this list are placed exclusively the mines operating in the group of seams that are subject to blowouts.

In all the mines of the third category auger holes varying in diameter from 2 to 3 in. are drilled in the solid ahead of the face. This is done to investigate the condition of the seam and to drain it at the same time of at least some of its gas.

CLEAVAGE JOINTS CONTAIN GAS

When a borehole is drilled across the joints of cleavage the reaching of every one of these joints by the auger is marked at the mouth of the hole by a puff of gas the strength and volume of which increases from cleavage to cleavage as the hole grows deeper, ending often by being strong enough to blow the dust produced by the auger 20 or 30 ft. to the rear.

When the hole is so placed and so directed that it runs between cleavages without running into any, the drillhole may be completed without the detection of gas. Sometimes the auger will run into coal so soft that drilling becomes surprisingly easy and rapid. In such cases, the gas always blows out of the borehole in great abundance and with terrific force.

A hole of this kind either stops itself promptly by caving or grows rapidly to a large diameter, reaching sometimes 15 or 20 in. or more and violently ejecting at the same time large quantities of fine coal and dirt together with large volumes of gas. This indicates that the coal has lost much of its cohesion, that the seam has suffered from crushing and that perhaps the coal was still being crushed at the time the hole was drilled. The crushing stage reached by the seam is indicated by the more or less fine condition of the solid materials ejected.

From the facts mentioned above as well as from others that will appear later the opinion now prevails among Belgian mining men that methane is present under two different conditions in all coal seams subject to blowouts:

First, as a free gas confined under more or less considerable pressure in the joints of cleavage, fissures and other empty mechanical spaces existing in the seam; second, under a special form making it, so to say, a part of the coal itself. This form, of which more will be said later, might be termed "latent methane." This is the gas that only expansion of the coal will liberate.

Whatever be the exact form under which latent methane exists in the coal, it seems safe to assume that it is one that is unstable except at pressures above that of the atmosphere. It also seems certain that the critical pressure of latent methane (the pressure at which, for such temperatures as rule in the coal, latent methane

becomes free methane) is inferior to 42.5 atmospheres, which is the highest pressure ever recorded in Belgian seams subject to blowouts. This pressure was recorded by V. Watteyne and A. Macquet in the "Mouton" bed, at the Bellevue Shaft, in the Mons district of Belgium.

That the pressure is no higher disposes of a theory still given credence by some on both sides of the Atlantic. This theory is that latent methane is that gas in liquid form. Under such pressure as 42.5 atmospheres methane cannot exist in a liquid state except at the low temperature of -100 deg. C. (-148 deg. F.) The temperature of the coal measures in Belgian mines of the third category is certainly not less than 28 deg. C. (82.4 deg. F.), a temperature at which methane will not turn liquid unless subjected to a pressure of 350 atmospheres.

That which happens when a borehole reaches a body of crushed coal brings to the mind the well-known example of water at high temperature in a boiler. Vaporization stops when the pressure corresponding to the temperature of the boiler is reached. This pressure is called the critical pressure of water for the temperature considered. Now, if without changing this temperature, whatever it may be, a hole of small diameter be drilled through the side of the boiler, an emission of steam mixed with water will take place. Similarly, when a borehole penetrates a crushed part of a seam, gas is ejected mixed with fine coal and dirt.

To push the analogy further it may be remarked that, just as the escape of steam and water lowers the pressure in the boiler and re-establishes vaporization, so the discharge of gas, coal and dirt through the borehole lowers the pressure in the zone affected by the drilling below the point at which latent methane will become unstable at the temperature of the seam. All latent methane thus affected becomes free methane, which in turn in forcing its way through the borehole carries along with it some of the coal and slate of the zone from which it comes.

We all know that when for some accidental reason vaporization in a boiler becomes instantaneous, great

mechanical forces come into play. It requires no great stretch of the imagination to understand that powerful mechanical effects similar to these are bound to result when in a large area of crushed coal, the ruling pressure falls everywhere at once sufficiently to permit all the latent methane present to become free methane. For this to happen the barrier of coal separating the mine workings from the high-pressure area of crushed coal must fail suddenly just as the shell of the boiler must fail if an explosion is to occur.

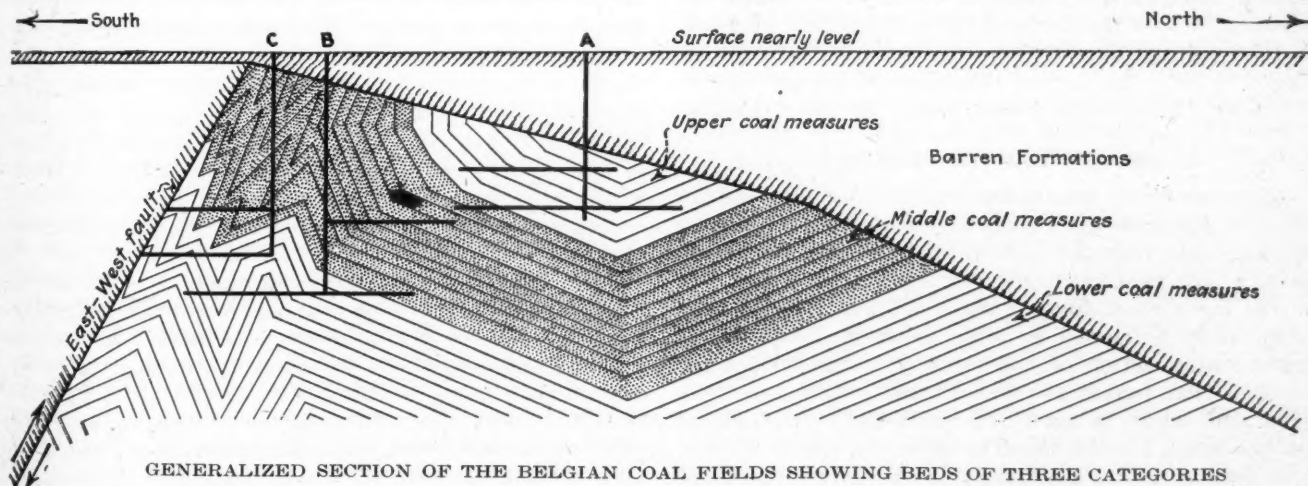
Many years ago the analogy between a boiler explosion and a mine blowout was used as the foundation for a theory that the later is in reality a case of instantaneous vaporization of liquid methane. This theory, however, was disproved, when it was shown, as previously explained, that methane cannot exist in a liquid state in seams subject to blowouts.

It is the pressure of the strata that causes a seam to expand. This pressure depends on the depth at which the seam is operated and the state of tension existing in the strata, including the seam, as a result of past geologic upheavals. What these disturbances have, in some typical cases done to the coal measures of Belgium is shown in the geologic section illustrating this article.

UNEVEN GEOLOGIC PRESSURES HAVE EXISTED

It makes evident the topsy-turvy conditions that predominate in those part of the Belgian coal fields where up to the present time, the seams subject to blowouts have been exclusively operated. The greater depths—4,000 ft. or more below the surface—where the same seams are expected to be found in regular formation have only just been reached.

Looking at the illustration it is not difficult to understand that some of these areas in the past may have been submitted to greater pressures than others. Even at the present time it is a fact of daily observation that there are in all seams subject to blowouts areas still under pressures that are entirely out of proportion to the weight of the overlying strata. This explains why



Seams which do not generate gas are in the first category. Those in the second category generate gas but do not have blowouts. Those in the third category have blowouts and, of course, generate gas. The upper coal measures consist of thirty-five seams and are non-gaseous. In the illustration they are unstippled. The middle coal measures are all gaseous with the quality progressing with geologic depth. They number in all some eighty seams. These seams, which belong to the second category, are stippled in the illustration. The Lower Coal Measures likewise are not stippled in the illustration. All of them probably

belong to the third category, though in what are known as the "flats," where the measures are not badly disturbed, blowouts may be less frequent. As these seams have not been extensively worked their number is unknown. It is, however, large. In shaft A, *bouveau* have been driven at two levels. The upper-level workings are all in the first category, the lower-level workings to the north and part of those to the south being in seams of the first category. Some, however, are in the second category, having extended to the middle coal measures. In shaft B the workings on the *bouveau* to the south are all gaseous but have no blow-

outs. Those connected to lower *bouveau*, north and south, are nearly all subject to blowouts. In shaft C the *bouveau* both run to the south and largely tap seams subject to blowouts, the lower *bouveau* developing, however, none but seams of the third category. The folds in the seams to the south, badly contorted as they appear to be, are actually even more severely folded than the illustration shows, for the folds instead of being simple, as portrayed, have minor irregularities that the illustrator has not introduced because they are almost too small for portrayal, though they add greatly to the difficulties in operation.

in seams subject to blowouts the cohesion of the coal varies widely from one area to another. While in one area the coal may have remained comparatively hard, in the next it may have been pulverized so completely that, to use the miners' expression, "it runs like water." Any degree of crushing between these two conditions may be met in any area.

It is not uncommon at all for a *bouveau* to tap a seam at some point of an area sufficiently crushed for a blowout to take place then and there. It is not even always necessary in such a case actually to reach the seam before the interruption starts. I remember an occasion most vividly, probably because it was my first experience of the kind, when the face of a *bouveau* gave out without any of the holes bored ahead having touched the seam, although when I measured them barely two minutes before, the length of none of them was shorter than 3 m., or practically 10 ft. The seam, where it was struck by the *bouveau*, was practically vertical and the roadway intersected it at right angles.

I also remember a case, although I did not happen to be in the mine when it occurred, where after four boreholes had reached the seam at depths between 9 and 11 ft. a blowout occurred while the fifth and sixth holes were being drilled.

Many instances of blowouts occurring at the faces of *bouveau*s have been recorded. In every such case the usual eruption of gas mixed with fine coal and slate was preceded by the familiar underground thunder and the crushing of timbers.

In regular mine workings, in areas where the coal has remained hard or has not been badly crushed, conditions generally will remain reasonably safe so long as the faces do not reach too close to a dangerously crushed zone. Boreholes driven sometimes 10 m. (33 ft.) ahead have, so far, proved the best means of ascertaining the closeness of danger, although such holes have long ago demonstrated their uselessness for gas drainage purposes. Nor must one rely too much on the margin of safety which boreholes may seem to indicate. Boreholes 2 in. in diameter showing no activity at all in the morning, before the day shift goes home may blow gas in torrents and dust by the ton through openings enlarged to 15 or 20 in., and this may occur even without the holes having been drilled deeper in the meantime.

SQUEEZE STARTED BLOWING

This probably is due to the fact that the boreholes in the first instance had reached close to a zone of badly crushed coal, that the barrier of safe coal remaining ahead of the men, critically thin and weak anyhow, was by the day's work further weakened and brought to a point where it ceased to offer sufficient resistance to the crushing action of the strata. A partial squeeze resulted that caused the dangerously crushed zone to grow sufficiently in extent to reach the inside ends of the boreholes, causing these to blow.

Eruptions of this kind follow by a short interval the usual thundering noise and cracking of timbers. The men flee in haste, although what is left of the barrier of safe coal sometimes resists until the fury of the manifestation has spent itself, which may take days, during which a large tonnage of fine coal and dirt will accumulate in the workings.

The results are much worse when the barrier of safe coal succumbs entirely to a squeeze. Then what constituted the barrier becomes as badly crushed as the zone immediately ahead, becomes in fact one with the

said zone. Under the now unopposed action of the strata compressing it the whole body of crushed coal expands into the workings. The pressure ruling in the freed, nearly fluid mass drops suddenly to that of the mine, causing the latent methane in that mass to become free methane with a rapidity that reasonably can be termed instantaneous.

I have laid emphasis on the subterranean, thunder-like noise and the crushing of timbers that never fail to announce the imminence of a blowout because they afford proof of a sudden increase in the pressure of the strata. This augmentation in the stress results in the final expansion of the seam and this in turn creates the blowout. All mining men know that what I have designated as underground thunder means a settling of the strata. The breaking of the crossbars and the bending of the props mean that the strata in settling bear directly upon the workings and the seam.

Considering the topsy-turvy lay of the strata, the sudden settling that takes place may as well originate in the floor as in the roof side, or it may come from both sides at once. It matters little which, for the results are the same. At any rate only a guess could be made as to the source of the pressure, especially as the natural floor may be over the roof in some instances. The seams pitch at all possible angles from level to plumb vertical, the roof being as often under as above the men's feet, a fact that causes Belgian mining men to use one or the other term, geologic floor or mine floor, depending on the idea they wish to convey. For the same reason they differentiate also between geologic roof and mine roof.

A SQUEEZE SOMETIMES STARTS FROM BELOW

That the sudden squeeze of the strata often proceeds from below is proved by countless instances of rocks being dislodged from the mine floor and thrown clear above it, only to be carried laterally sometimes for long distances by the force of the hurricane coming out of the seam. It must not be thought that the rocks thus carried far from their original locations are always small chunks of slate or sandrock. Masses weighing tons quite often are found to have been projected out of the mine floor and carried laterally over considerable distances.

A case in point I well remember. It occurred when, in 1896, I was visiting my old Belgian home. A block of sandrock found by measurement to weigh 3,700 kg. (more than 8,000 lb.) was thrown out of the mine pavement and carried up a 39-deg. incline, a distance of 10.5 m. (34.5 ft.) measured horizontally. This blowout occurred at the face of a slope in the coal at the Bellevue Shaft in the Mons district of Belgium.

The projection of rocks, large or small, out of the mine floor proves that the sudden squeeze of the workings and seam may come from below as well as from above. As such rocks could not be carried laterally by the blowout or any other agency unless first lifted above the mine pavement, it is clear that the lifting of the rock precedes the blowout. As the former is due to the same cause and occurs at the same time as the final crushing or expansion of the seam, it shows that the expansion precedes the blowout and is not the result of it, as was the general belief only a few short years ago.

The breaking of timbers and underground thunder are always accompanied by a puff of wind the intensity of which depends on the extent of the workings affected

by the sudden squeeze. This puff, called by the men "the first wind," is another phenomenon which the survivors always mention. It evidently is due to the sudden compression of the mine air by the squeezing of the measures.

Following on this comes the "second wind," which is incomparably stronger than the first and which is generally reported by the last of the fleeing men as coinciding with the report made by the final annihilation of the barrier of safe coal. The second wind, however, travels faster than the sound of the blowout itself. When giving their evidence as to what happened the men working at the shaft landing generally are unanimous in saying that they felt the second wind quite an appreciable time before hearing the report of the blowout.

The cagers often feel the second wind, despite the fact that, by reason of their distance from the seat of the blowout, they may fail to hear the sinister sound which accompanies it. This is interesting for in order to reach the hoisting shaft, which in Belgium is always the downcast, the second wind must be powerful enough to overcome the action of the fan.

GAS TRAVELED BACK AGAINST AIR

In a number of instances the pull of the fan did not prevent a torrent of dustladen gas from reaching and ascending the hoisting shaft. Of course, a similar stream passes out by way of the upcast and through the fan. In 1879, when I was only a boy, an outburst occurred practically across the street from my Belgian home, and No. 2 Shaft of Agrappe colliery, Mons district, Belgium. To this day this disaster has remained unparalleled, at least in Belgium.

Perhaps on account of its strikingly spectacular features and the excitement it created, it gave a much-needed impetus to the study of blowouts and of the means by which they may be prevented or, at least, made less disastrous to life and property. Although ever since 1847 blowouts had occurred now and then in Belgian mines, they never had attracted much public attention, probably because the public was not allowed to learn much about them. Those were the days of conservative journalism in Belgium.

In the case of the Agrappe blowout streams of gas and dust ascended both the hoisting and fan shafts simultaneously. As usual at the time, the headframe and hoisting engine were in a large one-room brick building the walls of which were some 4 ft. thick at the base and not less than 2-brick thick under the eaves. In winter the place was carefully closed against the weather, except for a pair of openings in an iron floor, through which the coal was dumped onto the screens. These passages served as inlets for the air being drawn through the mine by the fan.

The day was cold. An immense coal fire was burning in a monumental fireplace behind the engineer's seat. No one who was unlucky enough to be in the building on that day came out alive. It is easy, nevertheless, to understand what took place in that engine house. The gas pouring out of the shaft spread rapidly through the almost tightly closed building, mixing with the air and finally igniting at the open fire. The building blew up like a bomb, gas at the mouth of the shaft, the diameter of which was 18 ft., continuing thereafter to blaze, as illuminating gas burns at the tip of a burner.

Burning more fiercely and brightly as it went up further and found more air, the immense gas jet some-

times reached a height of 200 ft., dying down only to ascend again after a few seconds, making all the time a tremendous roar and exploding at short intervals, with terrific violence and with a noise that could be heard for miles. The flame and especially the black clouds of dust that went with it were visible from the City of Mons. After two hours the great gas jet suddenly ceased to burn. The torrent of gas, however, continued to roar for five hours longer, throwing high into the air clouds of dust of varying blackness and thickness, and at intervals pieces of clothing and harness, fragments of mine cars and doors.

A large Guibal fan was used to ventilate the mine. The top of its chimney was only a few yards from the hoisting building. When the latter was demolished by the explosion, the gas pouring out of the chimney ignited, and another explosion occurred that put the fan out of commission. No more flame was seen thereafter at the chimney of the fan or at any other place round about it. To the present day this has been the only example in Belgium of a mine fan being disabled as a result of a blowout or any other kind of gas accident.

Surprising as it may seem and did seem at the time, out of 288 persons who were in the mine 42 came out alive. One was a woman. The last of the dead were not found until more than two months later, after the workings had been cleared of an immense tonnage of fine slack and dust that had penetrated everywhere, on the intake side as well as in the return-airways as far as the fan shaft, the sump of the latter being filled with coal as was also that of the hoisting shaft on the very bottom of which the bodies of the cagers were found.

ALL THEORIES BUT ONE DISPROVED

What safety regulations were formulated and enforced as an immediate result of the Agrappe blowout will be mentioned in another article. The desirability of keeping this article within permissible limits does not allow a review of all the theories that have been advanced to explain the presence in coal seams of such enormous quantities of methane as are revealed by blowouts. With the exception of the Ruelle theory, the latest, which I now will try to explain, they have all been scientifically disproved. There is one, however, of those now obsolete theories that I desire to mention briefly for the reason that it was only quite recently that its definite refutation was made possible by Morin's experiments.

This theory is that the large quantities of methane found in the coal had been absorbed by it just as gases are absorbed by charcoal that has been allowed to cool in a vacuum. Such charcoal will absorb ninety times its own volume of ammonia gas, eighty-five times its volume of hydrochloric acid gas or large quantities of other gases.

It is admitted that the charcoal possesses this property of absorbing such great quantities of certain gases only by reason of its great porosity. Hard and compact carbon, like diamond and graphite, does not absorb any of the gases in any quantity whatever. This would show that the property of carbon to absorb certain gases depends wholly on its porosity. Evidently coal does not have the ability to absorb quantities of methane, for it is not porous until it has been expanded. But Morin has demonstrated that the capacity of coal to retain methane decreases as it expands.

Bold as at first may seem Ruelle's theory of latent methane, or polymethane, as he sometimes calls it, it

has the great merit of resting on a sound scientific basis, agreeing at the same time with all the facts and phenomena currently observed in connection with blowouts. This is much more than can ever be said of even the most plausible theories advanced in the past to explain the probable nature and real properties of the gas that causes seams of coal to blow out practically without notice.

MANY CHANGES ACCOMPANIED COAL FORMATION

Ruelle, explaining his theory before the Mons Society of Mining Engineers, goes into a mass of comprehensive and detailed scientific explanation to which I feel unable to do justice in a statement sufficiently abbreviated to fit within the limits necessarily put on this article. However, the scientific data upon which he bases the few assumptions he makes are undisputed and can be found in all up-to-date chemical reference books. I must be satisfied with presenting the following short statement of the new theory.

Ruelle is of the opinion that in past geologic times, when the wooden substance called cellulose, that was later to become coal as we know it today, went through the decomposition process that caused it to liberate the gas known as methane, it was in a condition still soft and doughy enough to supply the water necessary to a dissolution of the methane liberated. At a later geologic period, under subterranean pressure, the cellulose became solid.

The same actions that caused the solidification process also caused the water to disappear, perhaps decomposing it into its elements, which were then absorbed in the reactions accompanying the process. The methane was thus again liberated. It still was left, however, in intimate contact with the molecules of hardened cellulose. When a substance separates under pressure from another in which it was dissolved it generally polymerizes.

POLYMERIZATION DEPENDS ON PRESSURE

Polymerism, as is well known, is a term generally applied to the phenomenon by which a chemical body having the same chemical composition as another chemical body has nevertheless fundamentally different physical properties. A substance that has thus been transformed physically by a change of either pressure or temperature or by both of these, will regain its original form and other properties as soon as a return is made to the original conditions of temperature and pressure. When this happens the substance is said to depolymerize.

For any substance polymerized under compression there is always a critical point. Let the pressure be reduced below a certain degree, and the substance will at once depolymerize and return to its former physical condition. According to Ruelle, methane separating under pressure from the water that was holding it in solution may have polymerized. It might take the form, perhaps, of microscopic crystals, perhaps of microscopic liquid vesicles, attaching themselves to the molecules of coal and becoming, so to speak, one with said molecules.

That being the case, only one action could separate the polymerized methane from the molecules of coal and that would be a reduction of pressure below the critical point. Morin's experiments have shown to what extent coal sometimes must be crushed before the last of its gas abandons it. Wholesale crushing of a coal area,

causing it to spread into the mine workings, suddenly reduces the pressure below the critical point in the whole body of coal affected. Instantaneous depolymerization takes place through the coal and a blowout results, as has been explained already by the analogy between such a manifestation and a boiler explosion.

Importance of the Cement Industry As a Consumer of Coal

BY J. S. EATON.

AS THE fourth largest consumer of coal in the United States, the portland cement industry is a factor of growing importance in the demand for coal. Its position as a customer for bituminous directly follows the railroads, the iron and steel industry, and the public utilities. This rating so near the top may come as a surprise to many coal men who have not realized the large amount of fuel needed in making the country's cement.

Roughly speaking, one car of coal must be taken into a plant for every two of cement that are shipped out. Over half of this fuel is needed for burning the cement clinker, and the remainder is required in generating power for operating the heavy crushers, grinding mills, rotary kilns, conveyors and other equipment found in every mill.

The widespread activity in construction during 1922 sent cement production figures to new heights. According to data recently issued by the U. S. Geological Survey, the year's total was 113,870,000 barrels. In terms of the package almost universally used in shipping cement this means 455,480,000 sacks. Since crude oil is burned instead of coal in some parts of the country and natural gas also is employed to a small extent, the use of these fuels must be taken into account in estimating the coal consumed. With liberal allowances made for these substitutes, it appears that the coal consumption in the manufacture of cement was more than 8,500,000 tons in 1922.

The fuel requirements of the industry seem likely to become still greater, as the use of cement in all sorts of structures is increasing. In the two large fields of commercial building and roads this is especially marked. The manufacturers are already equipped to meet a considerably greater demand, for in 1920 the U. S. Geological Survey reported the producing capacity of the mills nearly 30 per cent above the record production of last year.

As building formerly was regarded strictly as a seasonal occupation, the demand for cement until recently has been largely concentrated in the six-months period May to October inclusive. The demand for new structures, however, has caused contractors to break through the prejudice against winter work, so that a large volume of construction is now carried on during cold weather. Much cement also is put in storage during this period against the peak demand. But the much greater summer activity normally results in a big demand for coal for cement manufacture throughout the warm months, when domestic and utility consumption drops off.

In all, as much as 200 lb. of coal or equivalent fuel is needed in making a single barrel of portland cement—that is, 50 lb. of coal to a 94-lb. sack. Expressed more vividly, for every sack of cement manufactured, nearly enough coal to fill that same sack must be bought.

Mining Seams Where Those Below Have Been Worked*

When Upper Seam Is About Twenty Feet Above Lower It Can
Be Mined After Coal in Lower Bed Has Been Entirely Extracted
—Do Not Work Upper Seam When Pillaring Seam Below It

BY HOWARD N. EAVENSON†
Pittsburgh, Pa.

IN MANY of the bituminous-coal districts of this country more than one seam of workable coal is found, and in most cases the lower seam is the more attractive, owing either to its greater thickness or its superior quality. Apprehension that the mining of a seam will destroy the availability of all overlying seams has hindered the development of many fields and has led to the unprofitable working of certain seams in order to save them from an expected total loss.

The United States Coal & Coke Co., Gary, W. Va., was the first operator in the Pocahontas field to mine the No. 4 seam extensively. This occurs about 80 ft. above No. 3, the seam which was worked first. No. 4 seam was worked at the Gary mines for the reason that over large areas that bed was the only one that was of a thickness which at that time could be mined at a profit. In two places both the seams were workable in the same area, the No. 4 being the thinner and containing more impurities than the No. 3 seam.

In mining these areas an attempt was made to keep the workings in the upper seam in advance of those in the lower one, and no pillar robbing was done in No. 3 seam until after pillars in that part of the upper seam directly over it had been mined. This resulted in an excessive development in the lower seam, with large areas of finished rooms and standing pillars. The top fell badly, and after a couple of years the falls became so heavy that pillar drawing was unduly expensive.

MADE INVESTIGATORY TOUR TO ASCERTAIN FACTS

To overcome this obstacle and allow No. 3 seam to be worked in some territory where No. 4 was thick but too dirty for present use, a study was made of operating methods applied to superimposed seams in Pennsylvania and Maryland. I started this investigation more than seven years ago, and my data, supplemented by more recent information gathered by my associates and by two instances, the information regarding which is derived from recent foreign publications, form the basis of this paper.

In central Pennsylvania the lower coal measures contain several seams of nearly the same thickness but of varying quality, and as mining has been conducted here for many years, numerous instances can be found where an upper seam has been mined after a lower one. A general section of the measures in Cambria and Somerset counties is shown in Fig. 1. The coal seams vary from 3 to 5 ft. thick and occur at intervals of 40 to 80 ft.; the intervening rocks usually are shales, slates or sandstones. By correspondence with engineers, mine inspectors and operators it was learned that in many places an upper seam was being worked with no trouble after a lower seam had been mined. In four mines visited, a careful investigation in the upper mine failed

to reveal any traces of damage caused by the removal of a 4-ft. seam 80 ft. below, and in one mine a heading over an area from which the pillars had been removed was of double-track width, without any posts and under good roof. In this mine it was reported that in driving the main heading in the upper seam, over a robbed area in the lower, a settlement of about 8 in. had been noticed, although the coal was in good condition. Rooms are driven 23 to 26 ft. wide with three rows of posts. It usually is necessary to drill holes to the lower seam to drain the water from the upper bed.

In another mine in this locality, recently examined, the *E* seam is being worked about 119 ft. above an area where the *C* seam was removed some years ago. Above the *E* seam are 8 or 9 ft. of slates and shales under a 28-ft. layer of sandstone; the intervening strata are slates, shales, sandstones and the *D* seam, the latter being about 32 in. thick and lying 25 ft. above the *C* seam. Mining was attempted in the *D* seam, but was abandoned on account of the damage done by mining the lower seam. In the *E* seam little settlement has occurred, but in certain places lying directly over robbed areas in the *C* seam heavy falls occur, which frequently extend up to the sandstone. This does not happen where the *C* seam has not been robbed. Cracks came up to this seam, draining the water off, but the overlying sandstone seems to be undamaged. Mining is considerably more expensive, due to the amount of dead work and timbering required, and the size of the coal produced is very fine.

One case was found where three seams in the same area were leased to three different operators, without any stipulation as to sequence of working, except that, if any settling was observed, protection should be left in the lower seams under the main headings driven in the seams above.

TWO THICK BEDS WORKED DESPITE SMALL INTERVAL

In southern Somerset County four mines are operating in the Redstone seam, immediately over the Pittsburgh coal. The latter seam averages about 8 ft. thick; the Redstone coal varies from 4 ft. to 4 ft. 10 in. and is overlaid by a fireclay 8 to 11 in. thick, bone and impure coal 14 to 20 in. thick, and a slate roof. Between the two seams the strata are mostly slate, which breaks readily into small pieces, but the actual bottom of the Redstone seam is a hard limestone from 2 to 6 in. thick. According to careful leveling, the distance from the top of the Pittsburgh to the bottom of the Redstone coal varies from 35 to 19 ft., the average being slightly over 26 ft. In general the headings in the upper seam are driven over those in the lower one, but sometimes this is not done; the headings are between 9 and 10 ft. wide. The fireclay over the coal is taken down and loaded out in both headings and rooms; the bone streak above this, wherever possible, is left up for a roof, and generally it stays up well. Where a heading or a room crosses a pillaring line in the lower seam, a break

*Article entitled "Mining an Upper Bituminous Seam After a Lower One Has Been Extracted," delivered at the New York meeting of the American Institute of Mining and Metallurgical Engineers, Feb. 19, 1923.

†Consulting engineer.

a few inches wide always is found in the seam and the top, the coal bending and dropping a maximum of 3 ft. vertically in a distance of 8 ft. horizontally. Fig. 2 shows this occurrence.

The experience in that district is that any two seams with this thickness of strata between them can be mined successfully if the lower seam has been entirely removed before mining the upper one; that the cost of mining the upper seam has not been increased perceptibly by the removal of the lower one; that the percentage of

areas where the underlying Pittsburgh seam has been removed. In the Georges Creek field the Tyson seam varies from 28 to 36 in. thick; the top is a sandy slate or shale, which shoots well and stays up well. The Pittsburgh coal has a total thickness here of 14 to 16 ft., of which 12 to 14 ft. has been mined. The interval between the two seams is from 77 to 81 ft. and is composed of shales, slate and 16 ft. of sandstone. Very little attention has been paid to the location of the workings in the upper seam with regard to those below. In these mines the greatest damage found in the upper seam was in an area about 150 ft. wide. Here the roof was so badly broken to a height of 6 to 8 ft. above the coal that it would have been unsafe to drive rooms under it. This section was directly over a barrier pillar in the lower mine between one robbed section and another. The damage could not all have been due to the lower workings, as nowhere else could more than a few cracks be found, or a very infrequent break, similar to Fig. 2, but having a drop of only 18 in. The only other trouble experienced was where rooms or headings had been driven in the upper seam and robbing had been done afterward below them. The water from the upper seam usually drains through cracks to the lower one.

SURFACE CRACKS LET IN DISINTEGRATING WATER

In the Connellsville region, where the Sewickley seam is being worked, it has an average thickness of 5 ft., the Pittsburgh coal averaging 8 ft. The bottom of the Sewickley coal usually is a hard fireclay, although sometimes a thin slate occurs between the fireclay and the coal. The top is either limestone, sandstone or slate. The interval between the seams is 72 to 142 ft. of shales, sandstone, limestone and slate. Careful examination of thirteen mines in the upper seam showed the existence—over many robbed areas of the lower seam—of surface cracks in which percolating water and air had disintegrated the top rock, causing local falls sometimes as high as 4 ft. These conditions were not observed where robbing had not been done in the lower coal.

Gas was frequently noticed entering the upper seam from the mines below. Where sufficient time had elapsed after robbing the lower seam, nothing was found in the upper seam that indicated any material increase of cost or of danger, or a diminished recovery of coal. The surface over many of these mines had been broken by robbing in the Pittsburgh coal, but in spite of this numerous pools of water, in one case covering an area of several acres, accumulated in the upper seam and had to be removed by pumping. These pools were over areas which had been mined out by the H. C. Frick Coke Co.

In two cases where the upper seam had been developed first, when robbing was done in the lower seam, subsidence of 3 to 4½ ft., with heavy roof falls, occurred in the upper one.

During recent years in the Pocahontas field the coal in the No. 3 seam has been worked in several instances. In one case, No. 4 seam, with an average thickness of 4 ft., is being worked over an area where the lower seam, 5 ft. 5 in. thick, has been robbed. The roof of the upper seam is 5 ft. of slate under heavy sandstone; the bottom is 3 ft. of fireclay. The interval of 60 ft. is mainly sandstone, with some slate. Robbing in the lower seam produced no visible effects in the upper except possibly some roof falls, which, however, were not different from those usually expected with that kind

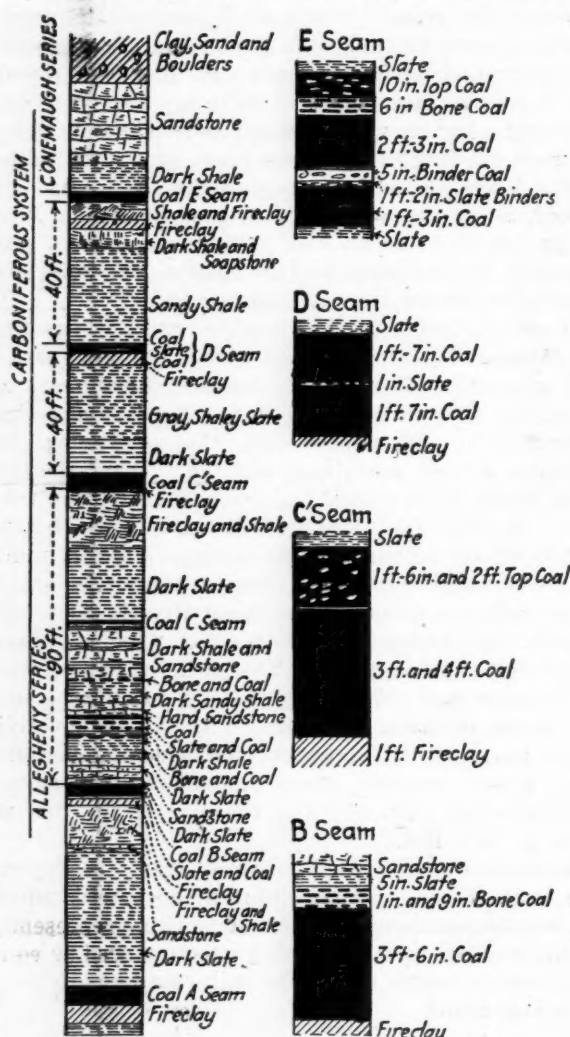


FIG. 1—SECTION OF STRATA AT PORTAGE, PA.

The E seam is being worked about 119 ft. above the area where the C was removed some years ago, the interval being 119 ft. Mining in the D seam, however, was tried and abandoned, owing to injury resulting from the removal of the C seam.

recovery has not been materially affected, nor has the element of danger been increased. It was the opinion that the upper seam could be worked three months after the lower one had been mined. It was generally necessary to drill holes to the lower seam to drain the water from the upper one.

At one mine the engineer for the lessor stated that 90 per cent of the coal was being recovered in the Redstone seam and that the cost of mining was not more than 4 to 6 per cent more than if the lower seam had not been mined. In view of the fact that the surface is often badly broken by the removal of pillars at depths of 200 ft. and more, the little damage done to the upper seam was almost unbelievable.

In the Georges Creek field in Maryland, and in the Connellsville region of Pennsylvania extensive mining is now being done in the Tyson or Sewickley seam in

of roof. There is some question in this case as to whether the robbing in the lower seam had been thorough enough to cause serious falls.

In another mine, No. 6 seam, averaging 3 ft. 8 in. thick, with sandstone top and fireclay bottom, is being worked where No. 3 seam, 5 ft. 9 in. thick, has been mined beneath it; the interval of 150 ft. is almost entirely sandstone, except a few feet of slate over the lower seam. The only evidences of disturbance in the upper seam are in two places where subsidence and roof falls occurred, the robbing in the lower seam having been done after the workings in the upper were driven. In all other places conditions in the upper seam appear normal and water frequently collects over robbed areas.

In still another mine, a higher seam, about 340 ft. above No. 3, is being worked where the lower seam has been entirely removed. The only trouble here has been due to surface cracks which allow water to enter the mine, from which it does not drain well to the lower seam. In a mine in southwest Virginia, robbing in a seam 5 ft. 10 in. thick caused cracks in the surface 570 to 794 ft. above, along a line more than 1,000 ft. long. An upper seam occurs 445 ft. above the lower one, and some trial headings were driven in this to learn the extent of the expected damage done by the robbing. Except for some cracks, through which air came from the lower workings, absolutely nothing was found in the upper seam, either in levels or in the character of the coal, to indicate that the lower seam had been removed.

In a paper by William Taylor Heslop* the following experience at St. Georges colliery, Natal, is described. There are two seams here, the top one about 4 ft. thick; the bottom one, including 9 in. of carbonaceous shale, has a total thickness of 5½ ft. Between the two seams is a bed of laminated sandstone, varying from 3 to 5 ft. thick. The immediate roof of the upper seam is about 17 ft. of shale, the total cover being 250 to 350 ft. of interbedded sandstones and shales. The seams are approximately level. At first the top seam was totally extracted from about 8 acres, and the area was allowed to settle for two years before the bottom seam was started. Several trials of this scheme, with both room-and-pillar and longwall mining, showed that the weight of the gob on the intervening sandstone caused trouble and loss of coal when working the bottom seam. The plan finally adopted was to drive all workings in the bottom seam, connecting the haulageways by inclines to the top seam. The bottom seam was developed by blocking it into pillars 39x75 ft., the working places being 15 ft. wide. The top seam was then developed in the same way, the workings being exactly over those below. When robbing commenced, a lift 18 ft. wide was driven 39 ft. across the end of the top pillar; when this was completed and the fall had occurred, a corresponding lift was driven in the bottom seam, making the gob line in the top never more than 33 ft. (18 ft. lift plus 15 ft. working place) in advance of the bottom seam. The overhang of the solid

roof protected the working lifts, and the sandstone between the two seams protected the lower lift from the gob above.

In a paper before the Mining Institute of Scotland, Dec. 9, 1922, the following experiences are described. Near Glasgow, the Main and the Jewell seams lie about 710 ft. below the surface. The Jewell seam, the lower one, is 22 in. thick and is separated from the Main seam, which is 24 in. thick, by 4 ft. of fireclay. In some places the upper seam was worked first, but in one place the bottom seam had been worked out for about three years before work started in the upper seam. The upper coal was found to be friable and produced much slack; although the roof was hard, it was broken, as a result of the first working, and the roads were diffi-

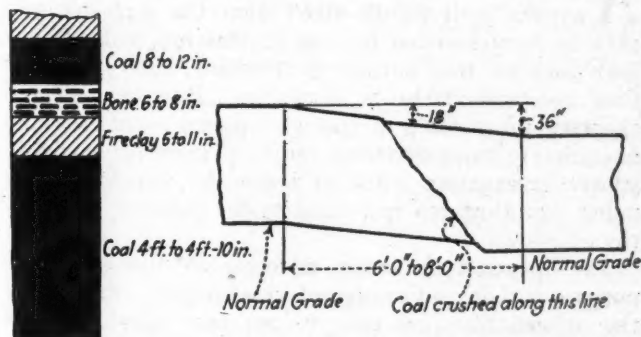


FIG. 2—BREAK IN UNDERMINED REDSTONE SEAM

How the coal breaks over the point where the work of removing pillars in the lower, or Pittsburgh, seam commenced. The interval between the seams is from 19 to 35 ft. and the Pittsburgh seam is 8 ft. thick, yet at one mine 90 per cent of the Redstone seam is recovered, and the cost of mining is not more than 4 to 6 per cent above that it would be if the lower seam had not been mined.

cult to keep open. The bottom, being soft, had a tendency to heave, and in some places it had dropped away from the coal. Care had to be taken when the mining machine was crossing an old road in the lower seam. By this method less timber was required and less dirt was produced than when the lower coal was worked after the upper coal had been taken out.

The table shows the comparative costs of mining in both seams and under both conditions, x representing the lowest cost. The shilling has been figured as equivalent to 24c.

The statement is made that when either seam is worked the other is more or less damaged, to an extent depending upon the nature of the strata. Where the top seam was worked first the damage consisted in hardening the coal, which was of no importance when machines were used. Where the bottom seam has been worked first, the damage consists in a large percentage of slack, which is not objectionable if the coal is for coking purposes. "Hence, one might say that the injury would be either real or apparent, according to condition."

Experience in all the above-mentioned localities seems to warrant the following conclusions: (1) Mining an upper seam after a lower one has been removed can almost always be successfully done when the thickness of intervening strata is 19 ft. or more. (2) The lower

*Journal, Chemical, Metallurgical and Mining Society of South Africa, October, 1921.

Section	Output per Shift at Coal Face, Lb.	Miners' Wage Rate, Cents	Machine Cutting, per Ton, Cents	Brushing, per Ton, Cents	Repairs and Overhead, Cents	Total Cost, Cents	Timber Cost Cents
Main (top) coal, where bottom is mined out.....	3,277	$x+19.8$	$x+5.0$	$x+6.4$	x	$x+27.2$	$x+1.2$
Main (top) coal, solid.....	6,101	x	x	x	$x+3.1$	x	x
Jewell (bottom) coal, solid.....	2,975	$x+63.2$	pick places	$x+3.1$	$x+8.7$	$x+47.2$	$x+0.6$
Jewell (bottom) where top coal has been mined out...	2,200	$x+32.0$	$x+17.4$	$x+41.2$	$x+23.2$	$x+81.106$	$x+7.2$

seam should be entirely removed from any area, and time should be allowed for settlement before working is started in the upper seam; the more complete the extraction, the less will be the likelihood of trouble in the upper seam. (3) Working in an upper seam should not be attempted while removing the pillars in a seam below it. (4) Percentage of recovery in an upper seam will not be materially reduced nor the cost or danger of mining be greatly increased because a lower seam has been removed.

Liquid-Oxygen Explosive Is Demonstrated At Martinsburg, W. Va.

AS FLAME is generated by the explosion of liquid oxygen it is hardly likely that the explosive will ever be recommended for use in blasting coal. It has been used for that purpose in Germany, but reports are that its employment is declining. However, enough shooting takes place at coal strippings, in tunnels and on mine railroad switches, surface tramroads and in general excavation work to make the possibilities of using liquid oxygen important to the industry and worthy of note.

The Germans are ardent advocates of using for this purpose carbon and oxygen of great purity. Frequently the oxygen they use runs 99 per cent pure, but that prepared for this purpose at the Real del Monte y Pachuca Co.'s mine at Pachuca, Mex., is slightly more than 95 per cent pure. The company mentioned is a subsidiary of the United States Smelting, Refining & Mining Co. The lampblack by which the liquid oxygen is absorbed is made by the combustion of *chapopote*, a residual gum of petroleum found in the crude state in the Mexican oil fields. This being an impure product absorbs in a ratio of 4:1 as compared to 4½:1 ratio attained with purer forms of carbon used by the Germans. They use burned cork for their carbon cartridges.

The oxygen at the Pachuca mine is prepared by an ordinary Mexican laborer and boy, so simple is the method of manufacture. The maximum pressure used in the process is 2,800 lb. The air is compressed until liquefied and then the pressure being lowered, the nitrogen, which is more volatile than oxygen, boils off, leaving a steel-blue liquid oxygen about 95 per cent pure. The Pachuca plant uses a 100-hp. motor for the liquefaction of the air and produces thirty-six cans of liquid oxygen per eight-hour shift, each containing 12 kg., or 26.45 lb., of oxygen. This is almost 1,000 lb. The gases formed are not visible. They consist of carbon dioxide. It is stated that no carbon monoxide is formed where the cartridges are properly saturated.

The first public demonstration in this country of blasting with this explosive took place Feb. 7 at the quarry of the Kelley Island Lime & Stone Co., about two miles west of Martinsburg, in the Panhandle of West Virginia. The tests, which were arranged by the U. S. Bureau of Mines were conducted by Adolph Messer, head of the German firm of Messer & Co., who has been in this country on business. This explosive in general is made by soaking sticks of carbon in liquid oxygen on the spot where the blasting is to be done. The holes are then

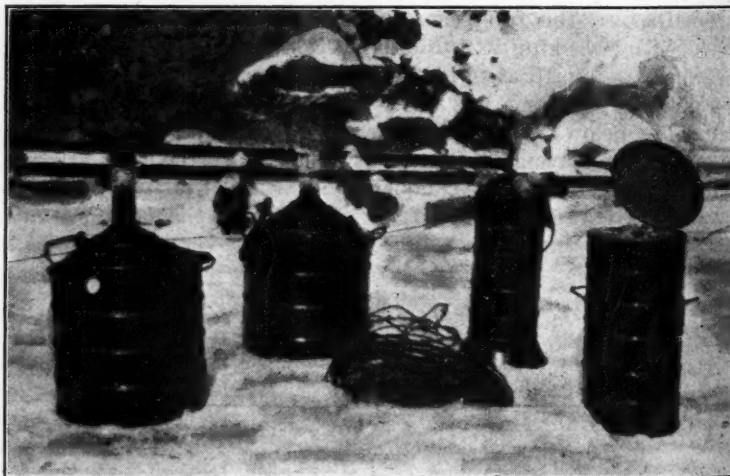
loaded with the saturated cartridges as quickly as possible, and blasting follows with the minimum loss of time, either electric exploders or the ordinary cap and fuse being employed. Blasting must follow quickly after the cartridges are removed from the soaking receptacle, because the evaporation of the oxygen soon renders them inert.

The liquid oxygen used was made at the plant of the Southern Oxygen Co., Washington, D. C., from which it was taken between 1 and 5 p.m., Monday, Feb. 5, and conveyed to the quarry at Martinsburg in double-wall vacuum-bottle containers most of which held about 35 lb. of the liquid. The flasks are not corked but have a hinged perforated metal cap. Oxygen is steadily lost from the containers by evaporation. By 7:30 a.m. Tuesday, Feb. 6, the average loss, according to the representative of the oxygen company, was 1½ lb. per 35-lb. container. The loss, it was stated, averages less than 0.5 per cent per hour; this despite the fact that the container is open to the air. Corking or closing of the container will result in its breakage.

SOME OF THE "LAMPBLACK" MIXED WITH CORK

Carbon cartridges of two kinds were used in the tests. One (D2) consisted of pure acetylene lampblack, and the other (A2) was composed of the same material mixed with 25 per cent unburned ground cork. The former, according to Mr. Messer, is considered equivalent, when impregnated, to 80 per cent dynamite, and the latter to 60 per cent dynamite. The lampblack was loosely wrapped in blotting paper so as to form roughly cylindrical sticks, 300 mm. (about 12 in.) long, and 35 or 40 mm. (1½ to 1½ in.) in diameter. These sticks before soaking in oxygen can be compressed easily with the fingers. After soaking they are frozen and brittle. Most of the cartridges used in the test were 40 x 300 mm. (1½ x 12 in.), each containing 75 gm. (2½ oz.) of pure lampblack. Immediately after soaking they weighed about ¾ lb. each, indicating a ratio of absorption of about 3½:1.

No. 8 electric exploders were used in the principal tests, one to each hole or charge. The cap was inserted in a hole bored through a wood cylinder or plug about 4 in. long and somewhat less in diameter than the drill-hole. Cap and plug were then lowered into the hole by the leads until they rested on the charge. Firing was



BLASTING EQUIPMENT ASSEMBLED AT COLLARS OF HOLES

On the left are the double-wall liquid-oxygen containers, each holding 15 liters. On the right are the soaking cans filled with carbon cartridges. Electric exploders and wood plugs rest on top of the unopened soaking can.

done with a No. 4 blasting machine of the Aetna Explosives Co.

The program included the blasting of one round of two holes, one of three holes, one "block shot," and two "pasters" or "mud caps." The two holes shot first were about 2 in. in diameter at the bottom and 20 ft. deep, drilled almost vertically and 10 ft. back of the quarry face. They reached practically to the level of the quarry floor, and at that level were approximately as far in from the face as at the top. The cartridges were prepared close to the collar of the hole. The equipment assembled for this purpose is shown in Fig. 1. Carbon sticks were placed upright in the double-walled soaking containers, which held from twelve to eighteen sticks, according to size. Liquid oxygen was then poured in from the oxygen container, flowing in a small steel-blue stream from the orifice. Rapid evaporation accompanied the pouring. The soaking cans were then closed and the sticks allowed to soak for about fifteen minutes. At least six minutes is required for proper soaking, according to the representative of the oxygen company and oversozing is better than undersozing.

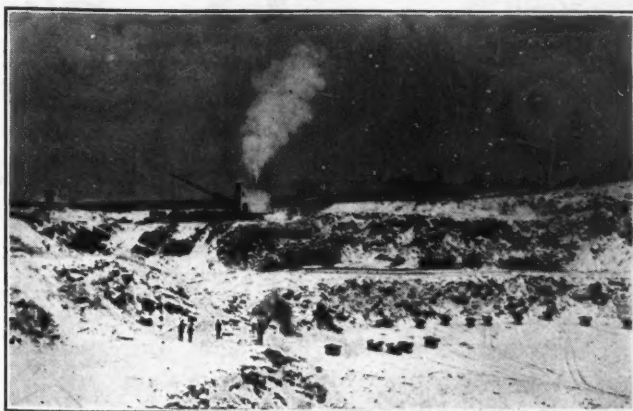
OXYGEN RAPIDLY EVAPORATES IN BOREHOLE

The cartridges were then removed one by one, as frozen sticks, from the can and dropped into the hole. If properly soaked, the entire cartridge should be saturated, though the bottom will be supersaturated. Immediately there was a rapid evolution of vapor from the hole, demonstrating the rapidity with which oxygen was being lost. Eighteen D2 cartridges were used in each hole. The charge was then carefully packed down with a long wooden tamping rod. The electric exploder and wood cylinder described above were lowered into each hole, a half powder box of fine sand poured in by way of tamping, the wires tested, and the blast fired. Loading consumed four minutes and the blast was fired within seven minutes after the first cartridge was dropped. Three men were employed in loading the two holes.

As a result of the blast, the ground was badly shattered over an area extending 15 ft. back of the face and 50 ft. along it. A moderate tonnage was thrown into the quarry pit. The general impression created, however, was favorable.

In the second test, three holes, respectively 20 ft., 16 ft., and 20 ft. deep, drilled almost straight down and 7 ft. apart in a line parallel with the quarry face and 8 ft. back of it, were loaded as before. The cartridges were soaked nineteen minutes, and two men loaded the three holes in six minutes. Sixteen 3-lb. sticks were placed in each 20-ft. hole and 12 sticks in the 16-ft. hole. The blast failed, however, though all three of the detonators exploded. This was explained by the theory that the evolution of gas from the charge lifted the wood cylinders by which the detonators were held, thus permitting the sand tamping to get between the exploders and the charge. Some even say that the detonators were thrown out of the holes.

After an hour had elapsed the inert carbon charges were easily blown out of the holes with compressed air. The 16-ft. hole and one of the 20-ft. holes were then reloaded. Soaking took fifteen minutes and loading three minutes, two men loading the 20-ft. hole and one man the 16-ft. hole. The third hole was abandoned because of insufficient oxygen. The manner of loading was changed in this test. Twelve cartridges were put in each hole before the electric detonator. Most of them



QUARRY OF KELLEY ISLAND LIME & STONE CO.

The tests with liquid oxygen were made in this quarry under the direction of the U. S. Bureau of Mines. One round of two holes, one of four holes and two "pasters," or "mud caps," were fired.

were of the A2 variety, containing 25 per cent ground cork and 75 per cent acetylene lampblack. On top of each exploder were then placed three D2 cartridges, followed by two A2 cartridges. Sand tamping was again used.

Before loading was finished, difficulty was experienced by the action of the escaping gas in blowing the sand and some of the topmost cartridges from the holes. These were finally wedged in and the charge was blasted. One hole broke well. The other was again a failure, giving a pyrotechnic display as flame from it spurted into the air. The opinion was expressed by Mr. Messer that the use of sand was evidently a mistake, though the first time it gave no trouble.

A "paster" or "bud-cap" shot gave remarkable results in shattering a huge block of stone in the quarry pit. Ten sticks of D2 explosive were fired with 8X cap and fuse. Two other minor tests gave good results.

During the tests the oxygen and cartridges used were not weighed, so that the total quantity of explosive used could only be gaged approximately in terms of "cartridges."

PREPARATION OF ELECTRICAL MINE-SAFETY CODES.—The Electrical Section of the U. S. Bureau of Mines has done considerable work in connection with the preparation and the compilation of data relating to safety rules and regulations for the installation of electrical equipment in mines. The following publications relate to this question:

Technical Paper 133, "Suggested Safety Rules for Installing and Using Electrical Equipment in Bituminous-Coal Mines."

Technical Paper 271, "State Mining Laws on the Use of Electricity in and About Coal Mines."

Serial 2224, "State Regulations on Accident Prevention Covering Electric Circuits in Coal Mines."

Serial 2258, "State Safety Regulations Governing Mine Telephones."

Serial 2405, "State and Federal Electrical Shotfiring Regulations."

Serial 2419, "Regulations Safeguarding Coal-Cutting Machines."

In addition to the above, tentative codes for the installation of electrical equipment in both coal and metal mines have been prepared. Copies of these codes can be obtained by any commission having the revision of state mine regulations under consideration.



Problems of Operating Men

Edited by
James T. Beard



Warning Against Mine Explosions

Frequency of Mine Explosions Increased
Since the Strike—Mine Workers Cautioned
to Avoid All Unsafe Practices in the Mine

THAT mine explosions have been on the increase, both in this country and abroad, during the past six or eight months, is not to be denied. In this country, it is natural to claim that the strike of the miners is, at least, one of the contributory causes for this condition, although there may be and probably are other causes for the increased frequency of these dread disasters.

I have read with interest the warning given out by the Chief of the Bureau of Mines, drawing attention to this matter. Certainly the appeal to awaken the slumbering regard of mine workers to this danger cannot be made too strongly. At the present time, there is little that is of greater importance than to arouse the interest of every mining man, from the official in the office to the miner at the coal face, and solicit their co-operation in efforts to make the mine safer.

While the six explosions mentioned in the warning to which I have referred resulted in the killing of 185 men, this sad accounting does not include the several smaller explosions that are taking place in our mines each week and killing from one to five men apiece.

LOCAL EXPLOSIONS COST MANY LIVES

If the whole story could be written, it would appear that there are occurring daily, in the mines many local explosions that, by the merest chance, do not extend further than a short distance from the place of their origin. That such is the case cannot be said to be due to good management. It is what most men call "luck" and a few a "merciful providence."

To the practical miner, the causes of these happenings are not mysterious. He knows that the following of a bad practice will sooner or later bring disaster. At the same time, almost without exception, the miner chooses to follow the easy way, instead of using the precaution that he would recommend to others and which he knows are essential to safety.

In other words, the average miner takes the chance in innumerable instances. He follows the line of least resistance that, while it may get results today, makes no promise for the morrow. Such, I regret to say, is the attitude of mind of the major portion of our miners toward their work, today.

THE FOREMAN KNOWS BUT TRUSTS TO LUCK

Every mine boss knows whether the working places in the mine of which he has charge are being adequately ventilated. Most of these bosses know, also, the condition of the gob. They may feign some surprise when told of a dangerous condition existing in a portion of their mine. But, if the truth was known, the informa-

tion afforded is nothing new to them. They have known of the condition for some time, but are trusting to luck, ignoring the danger while devoting themselves wholly to getting out the coal.

A miner's working place should be the safest place in the mine and any half-hearted, indifferent attitude on his part should not be tolerated. Again, failure on the part of the foreman to provide sufficient supplies and preserve a healthful and safe working condition must likewise not be tolerated. But who, let me ask, is to be held responsible for enforcing these conditions?

While it is not my disposition to throw responsibility that should rest on one party, onto the shoulders of another, it is my belief that there is no agency better able to enforce discipline in our mines than the State Department of Mines. The law gives them the power and their authority is widely respected. Let me close by stating that when the state realizes its responsibility for maintaining discipline in the mine, the occurrence of accidents and disasters will be less frequent.

Pikeville, Ky.

GEORGE EDWARDS.

Conditions That Invite Mine Explosions

Circulation not sufficient to dilute and sweep away gases generated—Air current not made to sweep the working faces—Large abandoned areas standing open.

MANY mine disasters occurring recently cause us to mask ourselves, again, what are the causes that lead to these occurrences? Though it is a well worn subject, a brief reference to some of the general causes or conditions that invite explosions in mines will not be out of place at this time.

All must agree that one of the principal causes of explosions of gas or dust, in mines, is an insufficiency of ventilation. The volume of air in circulation may be sufficient to comply with the requirements of the mining law and yet not enough to dilute and sweep away the gases generated in the workings of a mine.

LOCKED SAFETY LAMPS NO EXCUSE FOR INADEQUATE VENTILATION

No practical mining man will deny that such a condition invites disaster. The fact that a mine is being worked with locked safety lamps of an approved type is no excuse for inadequate ventilation and any attempt to operate such a mine when poorly ventilated is but taking a gambler's chance.

Another chief cause of the ignition of gas and dust present in the workings of a mine is the failure to properly conduct and distribute the air current throughout the mine. The fact that the volume of air entering a mine is all that is required to make the workings safe does not prove that the mine is properly ventilated.

Efficient ventilation means that the air entering the mine is distributed to the several ventilation districts in proportion to the need of each district. Not only that, but the air current must be made to sweep the

working face with sufficient velocity to dislodge and carry away what gases would otherwise accumulate there.

This will often require the erection of brattices, in rooms and working places, so as to conduct the air forward from the last breakthrough. In some cases, it may be necessary to erect a special brattice to deflect the air into some cavity of the roof or other void place.

A third and very important condition that invites disaster is permitting large abandoned areas to stand open, or attempting to ventilate them by passing the air current through such places and then permitting it to enter other places where men are at work.

DANGER WHEN AIR PASSES OVER FALLS

Safety requires that when a room, or a number of rooms forming a section of the mine, have been worked out and the pillars drawn such places should not be left to stand open without being properly ventilated. If they are ventilated the current passing through them should be conducted at once into the main return airway where it will pass out of the mine without reaching other working places.

Not long ago, I had taken charge of a mine where the ventilating current passed over many falls in the worked out section, before it reached the rooms where men were at work. In that mine, when the coal was taken out and the roof caved much gas would be given off.

The mine was worked with open lights and, while I took every precaution to keep the dust wet and the roadways clean, in my opinion, the place was not safe. I therefore requested the superintendent of the mine to allow me to change the circulation so as to ventilate the live workings with fresh air and conduct the air sweeping the falls directly out of the mine. This being refused I resigned my position and left the mine.

In closing, let me say that attention given to these and other points of equal significance will greatly reduce and perhaps wholly eliminate the disasters that are now so frequent in coal mining.

C. W. ATKINS.

Parnassus, Pa.

Overcoming Bumps and Outbursts of Gas Occurring in Mines

Suggestion of storing waste by flushing not effective—Outbursts occur in advance workings—Not known in worked-out sections.

KINDLY permit me to refer to the letter signed "M. E." and entitled "Gas Menace in Mines," which appeared in *Coal Age*, Dec. 21, p. 1001. In the latter part of the letter the writer refers to the occurrence of bumps and outbursts of gas in mines.

In his closing paragraph, the writer makes a suggestion that is worthy of comment, because of its evident inapplicability as a means of preventing these occurrences. It would seem, that, in making the suggestion, the writer did not stop to give the matter a second thought, or he would not have asked if the proposition was feasible.

After speaking of the danger of such occurrences, he states as follows: "In the same connection let me suggest the practicability of the stowing of waste in the worked-out portions of mines, by the hydraulic process, which some may style 'flushing.' Such a stowing of waste might prove an effective means of eliminating both bumps and outbursts of gas."

There are few mining men who have not heard of the use of flushing as a means of aiding in the recovery of pillars, under conditions that made it impossible to extract them in any other way. However, this is the first time that I have read of flushing being recommended for the elimination of bumps and blowouts in mines.

NO KNOWLEDGE OF OUTBURSTS OF GAS HAVING OCCURRED IN OLD WORKINGS

Though I have read of many outbursts of gas in mines in various localities and have investigated a number of them, in no single instance have these occurred in the worked-out portion of a mine. On the contrary, they have always occurred in the advance workings with which they are or seem to be associated.

Taking these facts into consideration, it is difficult to understand the ground on which this suggestion is based; or was it merely a passing thought that escaped the writer before he had given it special attention?

Previously, in his letter, the writer remarked, "While bumps in mines are dangerous, they are far less so than many outbursts of gas that have occurred. In some instances, the outburst has thrown down tons of coal and filled the mine passageways with gas and suffocating dust."

From this statement, it would appear that the writer recognized the fact that these occurrences took place, at least commonly, in the live workings of a mine. It would be interesting to know if our friend has any knowledge of such occurrences ever having taken place in worked-out sections. Assuming that he gave the matter any serious thought, it seems possible that he may have experienced occurrences of this nature in sections where the stowing of waste would have prevented their occurrence.

Before closing, allow me to ask the writer to whom I have referred, if he considers that flushing would have any material value in certain European mines, where outbursts have occurred in the advance workings, both in the bord and pillar and longwall systems of mining. Again, does he seriously think that flushing could have been applied with advantage in the mines of British Columbia, where large outbursts have occurred at Morrisey and elsewhere?

R. W. H.

Victoria, B. C.

Solution by Equivalent Orifice

Ventilation of shaft mine increased by adding another airway—Cube of the quantity of air passing varies as the square of the equivalent orifice.

REFERRING to the solution given to a difficult examination question, asking what increase of air in a shaft mine would result from the addition of another airway of the same size and length as the one already in use, *Coal Age*, Dec. 21, p. 1002, permit me to offer the following solution obtained by the use of the equivalent-orifice method.

The *Coal Age* journal is much appreciated here and read from A to Z; and it seemed to me that the following solution would be of interest to many students of ventilation. I will endeavor to give it as simply and briefly as possible, omitting unnecessary explanations.

The question referred to assumes a circulation of 10,000 cu.ft. of air per minute, passing in a single split in a shaft mine, and makes the resistance of the two shafts equal to that of the original airway. Then, assuming a constant power on the air, it is desired to

ascertain how much the circulation in the mine would be increased by the addition of a second airway of the same size and length as the first.

Applying the equivalent-orifice method, let A represent the equivalent orifice of the combined shafts and the original airway, when the air is passing in a single split; and let a and a_1 represent the respective orifices of the two shafts and the original airway. Then it can be shown that

$$\frac{1}{A^2} = \frac{1}{a^2} + \frac{1}{a_1^2} = \frac{2}{a^2} \quad (1)$$

remembering that a is equal to a_1 , since the resistance of the two shafts is equal to that of the original airway.

Again, let A_1 represent the equivalent orifice of the combined shafts and the two airways, after a second airway has been added of the same proportions as the first. In this case we have

$$\frac{1}{A_1^2} = \frac{1}{a^2} + \frac{1}{(2a_1)^2} = \frac{5}{4a^2} \quad (2)$$

Now dividing equation 1 by equation 2, we have for the ratio of the squares of the equivalent orifice of the mine, before and after the change is made.

$$\frac{A_1^2}{A^2} = \frac{2}{a^2} \times \frac{4a^2}{5} = 1.6$$

But, for the same power on the air, it can be shown that the cube of the quantity of air in circulation varies as the square of the equivalent orifice of the mine. In other words, the cube of the quantity ratio is equal to the square of the orifice ratio. Hence, the original circulation being 10,000 cu.ft. per min. and letting Q represent the increased circulation after the second airway is added, we have

$$\left(\frac{Q}{10,000}\right)^3 = \left(\frac{A_1}{A}\right)^2 = 1.6$$

and $Q = 10,000 \sqrt[3]{1.6}$

$$= 10,000 \times 1.1696 = 11,696 \text{ cu.ft. per min.}$$

ROBERT I. CURRIE, Head of Mining Dept.,
South Wales & Monmouthshire School of Mines.
Crumlin, Mon., S.W.

Inquiries Of General Interest

Retimbering an Old Slope When Opening a Longwall Mine

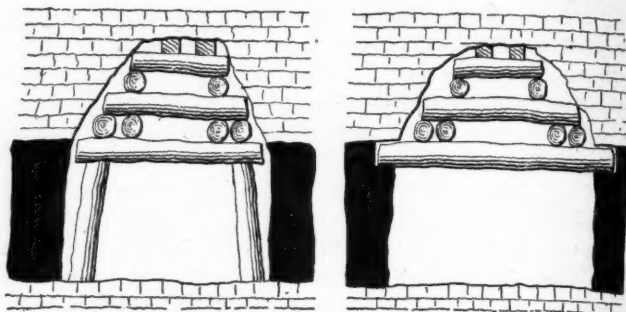
Slope 8 Ft. Wide, 500 Ft. Long, Dipping 20
Deg. Needs Retimbering—Should Crossbars
be Set in Hitches or Supported on Legs?

A PROPOSITION that has given me some little concern, recently, is the retimbering of a 500-ft. slope, at one of our mines. The slope is driven 8-ft. wide and dips 20 deg. Including the slate in the coal, the height of the seam is about 4 ft. The coal is overlaid with a soft roof. When the slope was driven, the roof was not brushed, but was timbered in the usual way with double timbering, the collar beams being supported on two legs. At the present time, the weight is breaking the timbers and the frail soapstone roof is falling to a considerable height above the road.

When this slope has been retimbered and is in shape to be used it is the intention to open out a longwall face at the foot of the incline. The roads or gateways will be driven across the pitch, so as to provide a suitable grade for handling the cars, which will then be hoisted up the slope.

The work of retimbering was started at the foot of the slope and had proceeded but a short distance when it occurred to me that we were making a mistake in choosing the wrong method of supporting the crossbars. The plan we had selected is illustrated on the left of the accompanying figure.

As there shown, the crossbars are supported on two legs. The timber frames are set about 3 ft. apart and heavy stringers or poles were used as lagging to span the space between. As shown, other cross-timbers were



TWO WAYS OF SUPPORTING ROOF TIMBERS

then laid above the lagging and this system was continued up to the solid formation above.

In this work, the old timbers are being used to fill the space previously occupied by the fallen material. The work looked good and we had imagined that the job was fairly well executed as far as it had gone. Pondering on the matter, however, has caused a doubt in my mind as to whether we have chosen the right method of supporting the crossbars.

It seems to me now that these should rest in hitches cut in the solid coal, as shown on the right of the figure, instead of employing double timber and resting the collars on the legs. What appeals to me is that, not only would we have saved the timber used for the legs, but all the timbers would settle more uniformly with the strata and excessive strains would be avoided had we chosen this second method of supporting the crossbars.

The question that puzzles me is to know whether my reasoning is correct. It seems to me that when the coal is taken out and the overburden settles on the gob, we can expect nothing but that the legs of the timber frames will be broken and the topping above the collars fall into the road.

To my mind, such a result is what is liable to occur in the adoption of the first method mentioned. Since it is most important to maintain a good roof over the main slope, we are anxious to have the views of *Coal Age* and its practical readers, as to the safest method of proceeding. The problem may be a simple one, but it appears to me as being worthy of discussion.

River Herbert West, N. S.

MAC.

Although the correspondent has mentioned his intention of opening a longwall face at the foot of the slope it is possible that he has in mind extending the longwall work above that level, on either side of the slope, and fears what effect the later extraction of the coal will

have on the slope itself. In that case, we think that his second suggestion of resting the crossbars in hitches cut in the rib is far better than resting them on legs, after the manner of double timbering.

The question of supporting the crossbars in hitches in the rib, in any case, depends primarily on the hardness of the coal. If the coal is soft and friable, it will not furnish the needed support to the crossbars and such a method of timbering would then be impracticable. It is also of interest to know the nature of the floor underlying the seam. The question is a practical one and we gladly submit it to the readers of *Coal Age*, in the hope of receiving many good suggestions.

Finding Percentage of Grade Expressed in Degrees and Minutes

No formula for calculating percentage of grade from degree of inclination—Use must be made of table of sines and cosines.

KINDLY explain how a person would go about the work of obtaining a formula that would provide a simple means of calculating the percentage of grade of a slope when its inclination is given in degrees and minutes. I have been unable to find any help from textbooks on this subject.

STUDENT.

Patton, Pa.

It is not possible to develop a formula for converting degrees of a circle into a co-ordinate system that would express the corresponding percentage of grade, either in terms of the horizontal distance or measurement taken on the incline. Referring to a table of natural functions, the tangent of the angle of inclination will give the percentage of grade, expressed decimally in terms of the horizontal distance. Likewise, the sine of the angle of inclination will give the percentage of grade, expressed decimally, in terms of measurement on the incline.

For example, a slope having an inclination of 30 deg. has a percentage of grade of 0.577, or 57.7 per cent referred to the horizontal distance. The percentage of the same slope referred to distance measured on the incline is 0.5, or 50 per cent.

Examination Questions Answered

Miscellaneous Examination Questions

(Answered by Request)

QUESTION—If the airway in a mine is 8 ft. high, 10 ft. wide and 3,600 ft. long, how much will the pressure have to be increased to pass the same quantity of air when the length of the airway has been increased to 7,200 ft.?

ANSWER—Other conditions remaining unchanged, the pressure will vary with the length of the airway. In this case, the length of the airway being doubled, the pressure must be increased in the same ratio. Therefore, to pass the same quantity of air through an air-

way of twice the length will require twice the original pressure.

QUESTION—(a) What are the principal causes of mine fires? (b) What precautions should be taken to avoid them? (c) Explain the method of approaching and fighting mine fires?

ANSWER—(a) The principal causes of mine fires are the careless use of naked lights, in mines generating gas, or in proximity to combustible material, such as hay, oily waste, or oil-soaked timbers. Fires may result from the ignition of gas feeders, in blasting coal; or the ignition of gas or dust, by the flame of a blowout shot, the sparking of wires or blowing out of a fuse. Again, fire may result from spontaneous combustion taking place in oily waste, or by reason of the heating of fine coal and slack stored in the gob.

(b) Strict rules and regulations must be observed regarding the use of open lights in mines; the blasting of coal and handling of explosives; the storage of waste and other combustible material when not in use in the mine. All electrical installations must be properly made by a competent mine electrician and every precaution taken to prevent the accidental short-circuiting.

(c) In fighting a mine fire, it must be approached only from the intake side. Experienced men must be employed for that purpose and they should be equipped with approved safety lamps. Men working in the mine must be notified and withdrawn at the first indication of danger.

QUESTION—What is the rubbing surface of an airway 8x12 ft., in section, its length being 6,550 ft.? (b) if the velocity of the air is 350 ft. per min. what is the volume of air in circulation?

ANSWER—(a) The perimeter of the airway being $2(8 + 12) = 40$ ft. and its length 6,550 ft., the rubbing surface is $6,550 \times 40 = 262,000$ cu.ft. per min.

(b) The velocity of the air current is then $262,000 \div 330 =$ say 794 ft. per min.

QUESTION—Find the water gage that should be produced by a fan in circulating 105,000 cu.ft. of air per minute in an airway 8x12 ft. in section and 5,000 ft. long, including the return.

ANSWER—The rubbing surface s and sectional area a of this airway are: $s = 2(8 + 12) 5,000 = 200,000$ sq.ft and $a = 8 \times 12 = 96$ sq.ft. Then, using the Atkinson coefficient $k = 0.00000002$, we have for the required water gage,

$$w.g. = \frac{k s q^2}{5.2 a^3} = \frac{0.00000002 \times 200,000 \times 105,000^2}{5.2 \times 96^3} = 9.6 \text{ in.}$$

This is an unusually high gage due to circulating the air a distance of nearly a mile at a velocity of $105,000 \div 96 =$ say 1,090 ft. per min. In practice this circulation would be divided so as to reduce the gage. Ignoring shaft and main airway resistances, if this air was made to travel in two equal splits the gage would be one-eighth of the previous amount, or 1.2 in.

CORRECTION

Attention has been kindly drawn to a typographical error that occurred in the reply to the second question on page 261, of the issue for Feb. 8, where the efficiency in steam-boiler practice is given as "varying from 3 to 7 per cent," instead of 50 to 70 per cent. The fair average evaporation due to burning the 5 lb. of coal, in that question should then be, say $0.60 \times 72 = 43.2$ lb. It may be more or less, depending on numerous factors, but chiefly on the heating value of the coal, type of boiler, manner of firing, etc.

Fear of Future Shortage Causes Hysteria In Northeast, Says I. C. C. Chairman

Personal attention to the fuel situation in northern New York and New England by President Harding, based on daily reports of the Interstate Commerce Commission; application by the Attorney General of New York State for authorization to seize coal on sidetracks on the ground that such cars have lost their interstate status; seizure of two cars of coal by the municipal authorities in Saratoga, N. Y., and advocacy by Mayor John F. Hylan of New York of seizure and control of the mines by the government were some of the developments in the coal situation last week.

Due to several days of low temperature New York City passed through the "worst combination of circumstances" it had seen in thirty years. While heavy ice floes made worse by the cold wave and a northwest gale prevented coal barges being brought across New York Bay and the rivers in anything like normal numbers, there was no real distress reported. Emergency complaints to the State Fuel Administrator's office multiplied rapidly. Several barges containing more than 10,000 tons of domestic sizes were sunk by the heavy ice, and at one time it was asserted by railroad officials that there were 75,000 tons of coal on the New Jersey terminals which could not be moved.

Efforts made to force the administration at Washington to embargo shipments to Canada apparently having failed, the municipal authorities at Saratoga, N. Y., on Feb. 19 seized nine cars of coal on the Delaware & Hudson R.R., releasing seven of the cars later on. The seizure was on the following day characterized as "ill-considered and unwarranted" by General George W. Goethals, State Fuel Administrator, who also said the seizure was made against the advice of Clarence B. Kilmer, district administrator for Saratoga, and representatives of the Federal Fuel Distributor and the Interstate Commerce Commission.

Chairman B. H. Meyer, of the Interstate Commerce Commission, discussed the fuel situation in New York State and New England with President Harding. Mr. Meyer informed the President that after the request of Federal Fuel Distributor Wadleigh for priority orders for coal shipments to districts in New York and New England the Interstate Commerce Commission sent agents into this region who submitted reports that in virtually every instance the shortage had been relieved. Mr. Meyer told the President that in his opinion it was fear of a future shortage if cold weather continued and not a present lack of coal that had created a condition of hysteria and that much of the complaint was due to the unwillingness of consumers in these sections to dilute their anthracite with bituminous coal.

The New York State Legislature passed a resolution by Senator Ferris requesting the State Fuel Administrator to exercise the power conferred upon him by law to take immediate steps to furnish fuel to the people of the state who are at present suffering and in great peril. This action was taken in view of the fact that General Goethals had shown some hesitancy in seizing coal and had sought to obtain co-operation with the federal authorities rather than proceed under the provisions of the New York State statute.

On Feb. 21 Mr. Ferris, in the Senate, and Mr. Bartholomew, in the Assembly, introduced a bill amending the public service commission law by inserting therein a new section prohibiting common carriers without consent of the Public Service Commission from establishing embargoes on shipments of coal or other necessities of life or refusing to accept shipments of such for transportation.

Carl Sherman, Attorney General of New York State, warned all communities that seizures of coal are "wholly unlawful" except when made under the direction of the State Fuel Administrator. When seizures are so made the price will be fixed by the Fuel Administrator and steps will be taken to replace any coal seized.

Deputy Attorneys General Edward G. Griffin and Francis W. Cullen appeared before the Interstate Commerce Commission in Washington and made application for authorization to seize coal on sidetracks, taking the position that such cars lost their interstate status when blocked in

transit. This view was also indorsed by Attorney General Sherman as well as by General Goethals.

Later in the week two cars of anthracite in the Mechanicsville yard of the D. & H. R.R. were diverted to relieve the shortage in that city by direction of District Fuel Administrator Kilmer. Earlier in the day residents of the city threatened to seize the coal passing on cars.

President Harding is being kept informed on the efforts made to relieve the situation in New York and New England by daily reports from the Interstate Commerce Commission. The commission is doing all in its power to meet the situation and stands ready to issue priority or other orders if the facts justify such action.

The New England coast was ice blocked for several days, the ice in some ports being from 15 in. to 2 ft. thick. Coast-guard cutters were employed to break the ice and let the coal barges through with their cargoes.

In Connecticut the State Police Department issued a request to the public to use substitutes.

A resolution said to have been offered in behalf of 20,000 miners of the Hudson Coal Co. was sent to Mayor John F. Hylan of New York City asking President Harding to intervene against "the rule-or-ruin tactics of the coal-carrying roads of the country." The Hudson Coal Co., it was charged in the resolution, had not operated its twenty-two collieries more than half time since last September. This was attributed to inability of the D. & H. R.R. to furnish requisite cars as a result of the shopmen's strike.

Mayor Hylan of New York, in a letter written at Palm Beach to Murray Hulbert, acting mayor, and made public Feb. 23, advocated immediate government seizure and operation of all mines.

Keeney Freed; Witnesses Tampered With

The trial of C. Frank Keeney, president of the West Virginia United Mine Workers, charged with being an accessory to murder in the Logan County miners' armed march in the summer of 1921, came to an abrupt end at Berkeley Springs, W. Va., Feb. 23, when Judge Woods dismissed the indictment on motion of the prosecution.

At the opening of court H. D. Allen, prosecuting attorney, asserted that four important witnesses for the state had mysteriously disappeared and he would not attempt to continue the case without them.

Judge Woods indicated that in the circumstances nothing remained for him to do but to grant the motion. T. C. Townsend, of counsel for Keeney, objected, stating that the witnesses in question also were witnesses for the defense and that three of them had come to him a day or two ago asking protection from deputy sheriffs from a "foreign county." They told him, he said, they had been compelled to make statements which were untrue.

Judge Woods ordered the witnesses brought into court. When they entered they were taken to the prosecutor's table and after a brief conference Mr. Allen told the court the men would not discuss the case with him and that it would be useless for him to proceed without them. Judge Woods agreed with him and Keeney was freed. The court ordered that the three witnesses be held for further investigation and that warrants be issued for any persons believed to have intimidated witnesses.

Sentence 47 of Cliftonville Mine Mob

Forty-seven men who were in the mob which burned the tippie at the Cliftonville mine, in West Virginia, near the Pennsylvania state line, last July were convicted or entered pleas of guilty to the indictments brought against them at Wellsburg, W. Va., Feb. 23. Sheriff Duvall and six of the attacking party were killed in the fighting.

Forty-three of the indicted men pleaded guilty to conspiracy and each was sentenced to serve three years in the Moundsville Penitentiary. The Grand Jury indicted 220 men, but only those in custody were caught. Seventy-eight were charged with murder. Four of these went to trial and were found guilty. Each was sentenced to ten years in the penitentiary. Indictments against those who have not been apprehended will stand.

Miners' Union Urges Detailed Probe of Anthracite; Union Disregards Facts, Says Warriner

In response to the recent request of the U. S. Coal Commission for suggestions and recommendations from the miners as to matters and subjects which the commission should investigate, the United Mine Workers of America filed with the commission Feb. 20 the first statement in behalf of the miners in the anthracite industry, the subject covered being "Mining." Additional statements to be filed later will deal with various other subjects connected with the anthracite industry. The first statement is signed by Thomas Kennedy, C. J. Golden and W. J. Brennan, presidents of the three anthracite districts of the miners' union, and Ellis Searles and John Moore, of the committee representing the union before the commission. The statement is as follows:

"We hereby accept your invitation to offer suggestions as to the range of facts that should be known about the anthracite industry and the ways by which they should be found out and made public. We realize that it will take time to get the essential facts, but that without them any pronouncements that might be made about the industry by strangers to it would be quite worthless.

"To show you from our more intimate knowledge of the industry the complicated problems of fact finding that Congress has set you, we present certain tables and estimates as close to the truth as is permitted by the very limited information made public. From these we conclude that the present monopoly organization of anthracite, through overcharges in each branch of the business, adds at least \$3.61 per ton, which is immediately discoverable, to the present price the consumer pays, and much more which cannot be exactly estimated.

(1) In mining, an average overcharge, per ton, of.....	\$1.26
(2) In land-owning, an overcharge which we will not attempt to estimate, but which may become the most disturbing factor in the industry in the immediate future.....	1.00
(3) In transportation, an average overcharge, per ton of.....	1.35
(4) In distribution, an average overcharge, per ton, of.....	33.61

"This sum ranges from \$4 and \$5 on domestic sizes down to approximately \$1 on smaller sizes to produce the average given. It is an overcharge which amounts to a total of \$252,700,000 on an annual commercial production of 70,000,000 gross tons. With similar prices, it would amount to \$270,750,000 on an annual commercial production of 75,000,000 tons, which is occasionally reached.

"With such estimates before us to establish and confirm our beliefs, we ask the obvious question: 'Are these overcharges inevitable?' Is the business of mining, transporting and distributing anthracite doomed always to be so organized that a few high-cost land lessors or real-estate speculators, a few high-cost collieries, a few railroads which choose to spend their incomes on vindictive labor war, and a few high-cost distributors scattered over the country can always create a situation in which the great bulk of low-cost operators, landowners, transporters and distributors will always be tempted to advance their profits at the expense of everybody else interested in the industry?

"We do not believe it is inevitable or in any way necessary. To get to the bottom of this situation, we are asking you to find the facts which will answer certain fundamental questions implied, but not directly stated, in your suggested topics. We should like you to inform us whether or not your investigation into facts will or will not finally include these questions.

"To connect your nineteen scattered topics with our questions, we have followed the natural division of the industry into: (1) Mining; (2) land-owning; (3) transportation; (4) distribution; (5) the future of the industry.

"Mining.—At December, 1922, prices, the mine operators appear to be receiving a net income of approximately \$1.48 for every ton of anthracite sold, including steam sizes. If these prices continue throughout 1923 until the expiration of the present agreement, they will make approximately \$103,600,000, which is over 30.8 per cent on their capital

stock or 41 per cent on what we believe to be the actual cash invested in capital stock. We believe that 22c. per ton will give a 6 per cent return upon the actual investment, and that everything above that is excess profit, taken and insisted upon not only at the expense of the consumer but at the risk of periodically disorganizing the industry.

"To determine the significance of your profit data, we ask you to determine the actual investment in the anthracite mines. This is the only figure which will give a basis for judgment as to excessive returns. We believe that this valuation should be done on the basis of original cost plus added expenditure. This is the only way to determine the amount allowable for deductions for depreciation and depletion. We stand ready to submit argument in favor of this basis of valuation of the coal mines.

"Six companies (the Lehigh Coal & Navigation Co., the Lehigh & Wilkes-Barre Coal Co., the Lehigh Valley Coal Co., the Philadelphia & Reading Coal & Iron Co., the Delaware & Hudson Co., and the Delaware, Lackawanna & Western Coal Co.) reported:

Net Income (All Six)		Surplus (First Four)	
1912.....	\$8,800,000	1912.....	\$10,000,000
1920.....	\$32,000,000	1920.....	\$74,000,000
(An increase of 363 per cent)		(An increase of 739 per cent)	

"If all the coal companies earned the same rate of return and increased their surpluses in the same proportion, the anthracite industry would show:

Total Net Income (Estimated)		Total Surplus (Estimated)	
1912.....	\$13,300,000	1912.....	\$24,000,100
1920.....	\$51,000,000	1920.....	\$192,400,000

"The information on these other companies has never been made public.

"In the face of such figures the miners are tired of the operators' common cry that coal strikes are caused by the lack of ability to pay better wages. There has just been a five months' suspension because of this disagreement over the question of whether the industry could or could not afford better wages and more satisfactory conditions of work. The miners drew on their credit, established laboriously over many years of constant and dangerous work, to support themselves during idleness. We agree with modern industrial engineers that the companies should do the same. There is no justification for the present high prices on the ground that the companies are paying for the expense they went to in their attempt to lower wages. If the companies are to protect themselves against such industrial losses by charging the public high prices, it would be equally just that the miners receive compensation of some sort from the companies for each day of every strike or lockout, and the miners have never asked for that.

"It is very important for the public to know the facts about profits and costs in detail. We know that the amount given as representing the value of the capital stock does not mean that anything like that figure was actually invested in the industry. We know that there are bookkeeping ways of increasing apparent costs and making the industry seem unprofitable. We therefore ask you not only to determine the present value but to establish and insist for all time upon a uniform accounting system similar to the one advocated by the Federal Trade Commission. Unless a satisfactory accounting system is adopted and enforced, the public and the miners will continue to disbelieve the statements of costs and profits which are now given so much publicity. We shall instead remember the report of the Engineers Committee of the U. S. Fuel Administration (1919) which said of the coal industry as a whole: 'depreciation was often put in as a guess. In some cases it was frankly stated that this seemed a good time to charge off improvements, and such were charged to the limit and beyond.' The same report spoke of depletion, which is another way of retiring the capital invested. It said: 'Depletion of lands was also an item which appeared greatly to trouble some of the accountants. While generally under-

stood, many very wild guesses, even up to the market price of the product, were found; also many instances of depletion charges for land operated on royalty or lease and not property of the operator.'

"These findings agree with our own beliefs that there are double charges made upon the industry in every branch, which are ultimately dangerous to its stability. We believe that much is charged to maintenance and repairs which should be charged to capital account. We, therefore, ask you to examine such charges on the industry with a view to eliminating everything which is unnecessary and unwarranted. Until that is done the anthracite-coal industry will not be able to give the efficient public service we believe it should give. We know it is natural under the present system of long-distance ownership that there should be such double charges, a keen desire for great profits, and a resulting indifference to the welfare of the men who are investing their lives in the industry.

"You will find out that this is because the majority of the coal mined is controlled by the railroad companies, which in turn are controlled by large financial interests in New York and Philadelphia, by men who have never seen the inside of a mine, but who attempt to regulate the meals, living and opportunities for schooling of the miners' families by their decisions on wages. It is known that the bankers played a leading part in the 1922 suspension. We ask you to convince yourselves of these facts as we are convinced, by tracing out the ownership of coal from the ground through the processes of mining, transporting and distributing—processes often controlled entirely by one interest which then takes four different profits on every ton.

NO GUARANTEE OF REGULAR EMPLOYMENT AND OUTPUT

"You will find that neither the present ownership nor the present management has yet been able to guarantee regularity of production and employment to the industry. In spite of the relatively steady work (256 to 272 days out of a possible 308) during the past few years, anthracite is not immune to irregularity. It is known that the coming of the 1922 suspension concealed the fact that there were to have been at least 60 idle days during the summer of 1922. You will find that this is due locally and occasionally to car shortage. The U. S. Department of Labor reported for November, 1922: 'Wilkes-Barre—Inadequate transportation has retarded employment in the mining industry.'

"We believe the possible irregularity of production is due to the apparently limited market for the average amount of anthracite produced. The market might have been widened: (1) If exorbitant freight rates were not charged on anthracite, which discriminated against it in favor of soft coal; (2) if middlemen did not take such a large share of the value of each ton; (3) if the operators and land lessees did not insist upon such large profits.

"We ask you to inform us of any ways by which the market for anthracite can be increased.

"You will find that there has been wastage of coal. There is less of this now than there was formerly, but where managements change, as they still do in the smaller mines, and each new management seeks to cream off what it can, the result is often that much coal may be lost. In certain mines the operators went right after the coal that was closest to the mouth drift, shaft bottom or slope bottom, and removed it without regard to the mining of coal further off. This desire for immediate production with apparently low costs resulted over a period of time in an increased cost of production because of the increased requirements for more timber props, etc. This condition could have been avoided if the mine had been worked with the purpose of getting out all the coal available instead of with the desire to get everything while the getting was good and to sell out as soon as the results of this policy became apparent.

"If it were possible for men to engage in the business of mining coal in order to produce fuel for the country instead of producing profits for a few investors, the amount of waste might be eliminated.

"We therefore urge that, if you limit your attention to the mere facts about the cost of living, wages paid in similar industries, and the superficial showings of the balance sheets, your work will leave the industry quite where you found it.

If your work is to be of any use at all in settling the coal question, you must take account of the whole range of claims upon the industry in the form of the various items of costs, wastes and the claims by capital holders—with the purpose of eliminating all exorbitant, unnecessary and consequently disturbing charges. Lack of a complete detailed statement year by year of costs, profits and investment in each branch of the industry has created a situation where the mining, land-owning, transporting and distributing departments of the industry shift the burden of proof for high prices from one to the other in an apparently high-minded desire to show that their hands are clean, their hearts are pure and their earnings low. Lack of itemized knowledge of the costs that enter into each branch is a difficulty we expect you to remove. This ignorance was the fact that led the consumers of anthracite (represented by the legal departments of Massachusetts, New York, etc.) to fear that the small increase (approximately 10c.) caused by the recent anthracite tonnage tax would result in an entirely disproportionate rise in the final price.

"We therefore ask you to discard the division of costs into labor, supplies and other expenses, and to make public in detail how much of the cost of a ton of coal is devoted to: (1) labor, (2) supplies, (3) power, (4) compensation insurance, (5) administration, (6) depletion and depreciation, (7) county and state taxes, (8) royalty.

"We ask that you make public the information you collect so that it may be stated in the following form: (1) Cost per commercial ton (itemized); (2) profit per commercial ton before federal tax; (3) profit per commercial ton after federal tax; (4) proportion of profit to actual investment.

"We recall your promise to give the miners representation in examining the cost figures of the various collieries and companies and again state our belief that this is essential.

"We have no confidence in the figures supplied in the past by the operators to the Department of the Interior or to the Federal Trade Commission, although the latter body made a more critical study of them. Any figures you may now ask for and receive will not differ in our estimation from previous compilations unless we are given the opportunity to know in detail what the figures are, and are given the opportunity to study, analyze and criticize the varying accounting systems used in their preparation."

WARRINER ATTACKS UNION STATEMENT

S. D. Warriner, chairman of the General Policies Committee of Anthracite Operators, on Feb. 21 issued a public statement pointing out the weaknesses in the assumptions made by the union representatives as follows:

"The purpose of the published statement of the miners' organization is inexplicable, unless it is to divert attention from the real cause of the coal shortage from which the public is suffering. The present shortage of anthracite is due exclusively to strikes, and strikes in the anthracite industry are at all times unjustifiable, because for over twenty years that industry has been distinguished by a labor board which provides for the adjustment of all disputes by conciliation, with final resort to an umpire. Notwithstanding this, and even since the settlement of the strike in the anthracite field in September, hundreds of thousands of tons of production have been lost by outlaw strikes in violation of agreements.

"The statement that the anthracite producers are overcharging the public \$3.61 a ton must, as the miners say, be based on 'very limited information.' It shows a reckless disregard of the facts for the miners' organization, with little or no information in its possession, to pretend to fix such a figure as \$3.61 as overcharge.

"The United States Coal Commission is making an elaborate investigation of the cost of production, transportation and distribution of anthracite, and the operators are co-operating with it in furnishing the necessary information as to the costs and profits. Until this information has been compiled and the commission has made its findings, it is absurd for any of the parties in interest to attempt to prejudge the case and mislead the public by any such statement as was published in the morning papers."

L. & N. Ry. Adopts Commission Plan of Car Allotment to Mines

The Louisville & Nashville Ry. has committed itself to the commission plan of car allotment to the mines on its system. This was agreed to at a meeting held in Louisville, Feb. 23, and will become operative March 1.

The acceptance of the commission plan was the result of months of work on the part of the various coal associations in the districts along the system, which held numerous meetings at their own headquarters, Louisville, Cincinnati and Washington. Special committees were drafted from those representing operators in southeastern Kentucky, northeastern Tennessee, the Birmingham district, eastern Kentucky, southern Indiana, western Kentucky and even the small group in the western part of Virginia had its voice in the matter.

A meeting of representatives of the special committees was held in the morning and elected Attorney Van Norman, who represents various coal interests but who had no particular axe to grind, chairman. J. H. Amos, of the Jewett, Bigelow & Brooks interests, Cincinnati, was made secretary. After threshing out the various plans that were proposed it finally was agreed that the commission system that is in use by the Norfolk & Western Ry. comes close to being the most workable if applied to the L. & N. The point whether it should be a three- or a five-man commission was left open.

Through various conferences held by coal shippers and representatives of the large coal-carrying roads operating in southern West Virginia during the latter part of February a uniform system of car allotment and car distribution was worked out, effective March 1, and under the agreement reached in all cases allotment commissions have been established whose members will visit personally the various coal mines and allot each mine the number to which it is entitled under the rules and regulations adopted. The meeting of shippers and officials of the Chesapeake & Ohio was held at Huntington and rules and regulations worked out at a conference there. Similar rules and regulations were worked out at a meeting between about 45 shippers on the Virginian Ry. and officials of that road at a meeting held at Huntington. The conference between Norfolk & Western shippers and officials of that road was held in Washington. J. W. Davin, of Huntington, is chairman of the Chesapeake & Ohio allotment commission of five; W. F. League, of the Virginian commission of three, and the understanding is that John Stewart will retain his position as chairman of the Norfolk & Western allotment commission and that the present commission of two will be enlarged.

Kanawha Operators to Consider Proposals Of Union Scale Committee

Operators from the Kanawha district in West Virginia, meeting at the Chamber of Commerce in Cincinnati on Friday, Feb. 23, elected to meet the United Mine Workers scale committee of that district for the purpose of hearing what proposals they have to make regarding the agreement which must be continued after March 31. To this end they appointed E. O. Dana, of Cincinnati (chairman); O. F. Harris, Cannelton, W. Va.; John Snure, Wheeling; John McKeever, Longacre; W. C. Michel, Plymouth; A. W. Pollock, Ramage; A. W. Fugel, Blakeley, and A. Michire, of Charleston, as their scale committee.

As the Kanawha district stands at present about 65 per cent of the tonnage is being produced on an open-shop basis and 35 per cent under agreement with the miners' union. Of the latter the mines on the Kanawha & Michigan R.R. are organized 100 per cent and about 20 per cent of the production on the Chesapeake & Ohio side of the river is put on wheels by closed-shop miners.

The open-shop production is fathered principally by the Kanawha Operators' Association and these are firm in their resolve to continue the policy. It developed through the meeting that some nine mines would find it impossible to continue production under the scale agreed to at the New York meeting and that they might be forced to stay out if an agreement is entered into with the union. This would cut the C. & O. tonnage to 12 per cent instead of 20. Many

angles of the conditions that have to be faced were gone over and the drafting of the scale committee would indicate that further negotiations are in sight—even though Frank Keeney, as the spokesman for the unionists, issued a bombastic statement on Saturday regarding the basis of settlement that the miners intended insisting upon.

Colonel E. O. Dana, who was the chairman of the Cincinnati meeting, said: "It was the consensus of those present that we should meet with the miners at a later day and closer to the time when the existing agreement expires. There will also be further meetings of the operators between now and that time."

Walsh Asks Data on Anthracite Impurities

Under the terms of a resolution introduced by Senator Walsh of Massachusetts Feb. 26 and adopted by the Senate with only brief discussion, the U. S. Bureau of Mines is directed to report to the Senate the results of its studies of anthracite coal in purchases for government use in Washington. Specific reference in the report is asked regarding the extent to which impurities and misgrading have been found in domestic sizes of anthracite; what information the bureau may have as to the extent of impure or misgraded anthracite generally marketed to the public, and whether it is the opinion of the bureau that legislation should be adopted seeking to establish market grades in size and quality of anthracite shipped in interstate commerce.

The preamble recites that there is "general complaint of the marketing to the public of anthracite coal of misgraded sizes and containing a large proportion of impurities."

Senator Walsh's bill to establish standards of anthracite coal in interstate commerce, which he introduced several weeks ago and which had been on the table, was referred to the Committee on Mines and Mining last Friday when reached on the calendar. Senator Walsh attempted to obtain immediate consideration, but Senator Poindexter, declaring that the bill required study and probably would need "considerable amendment," insisted upon a motion that it be referred to the committee, this motion prevailing.

I.C.C. Revokes Service Order 38

Washington, Feb. 27.—In vacating its Service Order 38, the Interstate Commerce Commission practically admits its mistake in having issued this order over the protest of Federal Fuel Distributor Wadleigh. This service order gave a large preferential car supply to the Mountevallo mine in Alabama without charging the cars against the distributive share of the mine. After the order was issued Mr. Wadleigh again objected and requested reconsideration of the order and its annulment. Another indication that Mr. Wadleigh is right in his analysis of the situation was the fact that the mine was unable to load a considerable proportion of the cars which it received during the time the service order was in effect.

Asks Hammond to Combat State Coal Laws

A public utterance by John Hays Hammond as to the inadvisability of coal legislation by the several states has been asked by J. C. Brydon, chairman of the bituminous operators' special committee. The request was made because it is feared that state legislation may change conditions so that the commission's report will be made to Congress on facts obtained before the situation was changed by state legislation.

The bituminous operators' special committee will meet March 8 in the law offices of Henry L. Stimson, 32 Liberty Street, New York City.

Lewis to Study British Coal Situation

John L. Lewis, president of the United Mine Workers of America, was a passenger on board the White Star liner Celtic, which sailed from New York City Feb. 24 for Liverpool. He is going to make a six weeks' survey of the coal situation in England. Mr. Lewis said that he would visit the heads of the mine workers all over the United Kingdom and study production and labor conditions.

Coal Commission Now Likely to Get Funds

Washington, Feb. 27.—Chairman Madden formally announced today on the floor of the House of Representatives that the Appropriations Committee of the House is in full accord with the President's Coal Commission. "We would like very much to have recommended an appropriation of \$400,000," he said, "but we realize that there is no law that authorizes us to do it. I believe the facts that may be found by the commission, judging from the work it has done already, would justify the expenditure of a very large sum of money."

The significance of this statement from the chairman of the Committee on Appropriations is that a Senate amendment will be accepted by the conferees on the deficiency bill, which practically assures the ultimate voting of the money.

Decision Rendered in Ohio & Kentucky Ry. vs. Louisville & Nashville R.R.

The Interstate Commerce Commission on Feb. 19, 1923, handed down a decision and order on Docket No. 13602, the Ohio & Kentucky Ry. Co. vs. Louisville & Nashville Railroad Co., involving the division of rates on northbound coal.

The line of the Ohio & Kentucky is wholly within the State of Kentucky and extends from O. & K. Junction to Licking River, 38.43 miles. That portion of the line from Cannel City to Licking River, 12.8 miles, is operated under lease from the Caney Valley R.R. Ohio & Kentucky passenger trains are operated from O. & K. Junction to Jackson, 1.37 miles, under trackage rights with the Louisville & Nashville R.R., hereinafter referred to as defendant. All freight is interchanged with defendant at O. & K. Junction.

The important action taken by the commission in this case is to apply the principle established in the P. & W. V. case, that reasonable divisions established prior to the various general increases in rates made during the past few years, should be increased proportionately as the joint rates were increased in order to take care of the growing burden of operating expense.

In this case (Ohio & Kentucky) the division first established on May 1, 1919, is used as the base, because prior to that time no joint through rates were in effect, the coal originating on the Ohio & Kentucky moving out over the L. & N. through O. & K. Junction on combination rates based upon a proportional rate published by the O. & K. Ry. to O. & K. Junction plus the rate published by the L. & N. from that point to destination.

On May 1, 1919, joint rates were published from O. & K. mines on the basis of 20c. over the rate from O. & K. Junction on the rates from O. & K. Junction on the L. & N. The situation since May 1, 1919, on divisions, as disclosed by the report is as follows:

TO ALL DESTINATIONS NORTH OF THE OHIO RIVER, WEST OF THE BUFFALO-PITTSBURGH LINE AND POINTS IN WESTERN TRUNK LINE TERRITORY

		From O & N Jet. to Three Mile Inclusive			From North of Three Mile to Wilburst			North of Wilburst		
		1	2	3	1	2	3	1	2	3
May	1, 1919	25	...	...	25	...	...	27½	...	...
Aug.	26, 1920 ^a	33½	...	...	33½	...	...	36½	...	...
March	3, 1921 ^b	...	35	...	...	35	...	...	38	...
May	25, 1921 ^c	...	34½	...	...	34½	...	...	37½	...
Oct.	6, 1921 ^d	15	...	...	27	...	...	30½	...	...
June	16, 1922 ^e	15	32½	28	27	34½	34½	30½	37½	37½
July	1, 1922 ^f	13½	29½	25	26½	31½	31½	29½	34	34

(a) General advance of 33½ per cent. (b) Advance of 4 per cent. (c) Reduction of 1½ per cent. (d) Reduction of 9 per cent. (e) Joint rates on the district basis were established by order of I. C. C. from stations O & K Jet. to Three Mile, inclusive, which meant a reduction of 20c. a ton. Rates from stations north of Three Mile not changed. (f) General reduction of 10 per cent.

In column No. 1 above are shown the divisions actually in effect between the O. & K. and L. & N.

In column No. 2 above are shown the divisions that would have been in effect if they had been changed in accordance with the increases and reductions in the joint rates.

In column No. 3 are shown the divisions fixed by the I. C. C. in this case, Docket No. 13602.

The division of 37½c. to Cincinnati is not involved in the case. The divisions to stations on pages 98 and 99 of

the effective tariff and to Jeffersonville and New Albany, Ind., are ordered by the I. C. C. to be adjusted on a pro-rata basis to the divisions prescribed above.

It will be noted that the I. C. C. fixed divisions for points north of Three Mile in the same amount as those shown in column 2, but from O. & K. Junction to Three Mile, inclusive, they fixed a lower division than shown in column No. 2. This latter was done because the carriers had partly sustained the burden of proof that they should be lower, most probably because of the establishment of joint rates from the latter stations on the district basis, effective June 16, 1922, which meant a reduction of 20c. per ton on the rate.

The I. C. C. also suggests that passenger fares on the O. & K. should be increased and that the O. & K. should arrange for a reduction in the rental of \$500 per month paid to the Caney Valley property. This latter means a return of 3.29 per cent on the value of the Caney Valley as indicated in the report of the Bureau of Valuation of the I. C. C., which that road could not earn as an operating carrier.

Marked Increase in Production in January

Most of the figures thus far received regarding January business conditions, according to the Survey of Current Business prepared in the Bureau of the Census and printed in *Commercial Reports*, show a very large productive activity, with new high records in many cases. "Cotton goods, pig iron, steel ingots, locomotives, zinc, bituminous coal and flooring are among the basic commodities whose January production figures show the largest output since the boom period of 1920. Sales and unfilled orders show the same upward trend, especially in metals and building materials. The large car loadings and seasonally high retail sales, as well as the general depletion of manufacturers' stocks, indicate that the goods produced are quickly passing into consumption."

Arc from Broken Feeder Line Caused Dawson Explosion, Says Coroner's Jury

A derailed car on an outbound trip knocked down haulage-way timbers, dropping a feeder power line onto the steel car, striking an arc which ignited coal dust. This is the direct cause assigned by a coroner's jury for the Feb. 8 explosion in No. 1 mine of the Phelps Dodge Corporation at Dawson, N. M. The jury, impaneled by T. L. McKinney, justice of the peace, reached this decision after long hearings following the explosion. The mine, in which 122 men lost their lives and much property damage was done, is now cleared, but extensive repairs underground and at the mouth of the slope must be made.

High Court Reverses Central Coal Verdict

In a brief decision, Feb. 26, the U. S. Supreme Court in effect nullified the Arkansas State law permitting suit in any county of the state by a citizen of the state against a foreign corporation which engages in business within the boundaries of Arkansas. The case at issue was an appeal by the Central Coal & Coke Co., a Missouri corporation with mines in Sebastian County, Ark., from a decision of the Arkansas Supreme Court sustaining a lower state court in a judgment rendered Jacob Ocepek, formerly an employee of the Central company, for personal injuries.

Monongahela Operators and Miners Sign Up

The Monongahela Coal Association and the district officers of the United Mine Workers signed an agreement at Pittsburgh, Pa., Feb. 20, on wages and working conditions for the year beginning April 1 next. The agreement covers about 45 mines in the Morgantown (W. Va.) district, in which about 10,000 miners are employed.

In explaining the wage agreement, John H. Jones, president of the Bertha Coal Co., said that the scale to be in force would be the same as that which at present prevails in the Morgantown field.

U. S. Coal Commission Will Suspend Work March 4 Unless Congress Grants Additional Funds

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Since there have been too many inconclusive investigations of the coal industry, the President's Coal Commission is prepared to suspend its work on March 4 if Congress does not provide it with the necessary funds to continue its program on the scale outlined. It was announced on Feb. 24 by Chairman Hammond and Commissioner Smith that the commission is unanimous in its conclusion that it would be undesirable to attempt to continue its work even until the funds at its disposal are exhausted. On March 4 the commission will have \$85,000 of its appropriation still on hand. This will not carry its investigations to a conclusion.

It is not a foregone conclusion that Congress will not furnish additional funds for the commission's use. No appropriation is carried in the deficiency bill as reported out of the Appropriations Committee of the House on Feb. 22. It is possible to attach the appropriation to that bill on the floor of the House or it may be carried in a Senate amendment. There is every reason to believe that the leadership in Congress is entirely willing that the commission should have its \$400,000. It was excluded from the deficiency bill because it would have been subject to a point of order since the legislative authority for the appropriation had not been voted. Chief blame is laid at the door of Chairman Winslow, of the Committee on Interstate and Foreign Commerce, who has insisted on subordinating the legislation desired by the commission to the Cape Cod Canal proposition, alien property legislation and other controverted matters which have prevented consideration of coal legislation, which probably would not have led to protracted discussion. Dr. Smith states that the commission has no evidence whatever of any concerted effort either inside or outside of Congress in opposition to the legislation.

HAMMOND AND SMITH SPEAK FRANKLY

Both Chairman Hammond and Dr. Smith were entirely frank in expressing their views to the Committee on Appropriations. This is shown by the following verbatim extract from those hearings:

Chairman Madden—What would happen to the investigation if you are confined to your present appropriation?

Dr. Smith—I think the chairman of the commission will bear me out in saying that it is not worth while to continue it, if we do not get this additional appropriation.

Mr. Hammond—It would be a sheer waste of money. It would be like starting to build a dam and only completing one-half of it. It would be foolish. It would be much more economical for us to return the unexpended money to the government. As a matter of fact, we cannot undertake to continue the investigation unless we get the appropriation for which we are asking. We pared it down from \$540,000 to the irreducible minimum of \$400,000. We do not see how we can cut it down more and have a report worth presenting to Congress.

Chairman Madden—Is the commission unanimous in its request for this appropriation?

Dr. Smith—Yes sir; and also unanimous in the belief that it would not be worth while to continue this investigation after March 4 unless this additional appropriation is allowed, and that we should stop the investigation then and save what we can of the appropriation already made.

Chairman Madden—Is the commission unanimous in the belief that the investigation will result in something worth while, if the additional money is appropriated?

Mr. Hammond—We will guarantee it.

Dr. Smith—I would like to add the fact that the commission believes it had a great deal to do with settling the labor difficulties so that we were assured a month ago that there would be no strike on April 1. As a result, the soft-coal market has been softened very much. In four weeks the average price for bituminous coal has gone down 84c.

Chairman Madden—Do you think the commission contributed to that reduction?

Dr. Smith—We have been blamed for it by some of the coal operators.

Mr. Hammond—I think the operators admit it. Of course, we are abused by some of them because we despoiled them of their profits.

Dr. Smith—Ordinarily that labor situation is not settled until the eve of April 1, if it is settled at all.

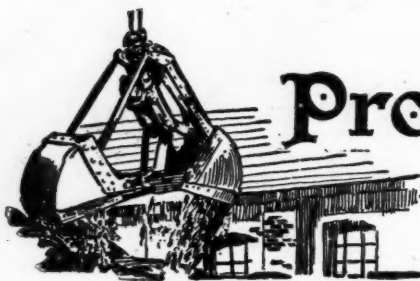
An indication that the commission fully expects to obtain its appropriation is had in the announcement of plans for visits to various coal-mining regions. Dr. Devine and Mr. Neill expect to make a first-hand survey of the situation in Oklahoma and Texas mining districts. Chairman Hammond, Governor Marshall and Commissioner Howell already have made their railroad reservations preparatory to a trip to the Alabama fields early in March. Dr. Smith expects to visit a number of the fields nearer to Washington.

Like the Cloaca Maxima, the principal sewer of ancient Rome, the commission is being made a dumping place for all sorts of theories and panaceas. Several of the interests closely concerned with the investigation have addressed communications to the commission which were in fact propaganda. The United Mine Workers have issued two such statements within a week. On the other hand, the commission is a recipient of a great mass of helpful data. Among other things, its attention has been called to a widely held belief that coal operators have not made sufficient use of engineering skill. The record is said to be clear that expenditures for engineering talent and advice represent an insignificant portion of the expense of coal-mine development—very much in contrast with the amount expended for engineers in metal mining. Some engineering methods in the coal industry are held to be entirely inexcusable. Most metal mines, it was pointed out, operate on a 24-hour basis. Most coal mines work only one shift. As a result the great investment in plant and equipment is not being utilized throughout twenty-four hours. Were the mines to be operated for even two shifts, many believe it would have the effect of eliminating more of the high-cost mines and would make for a better labor situation.

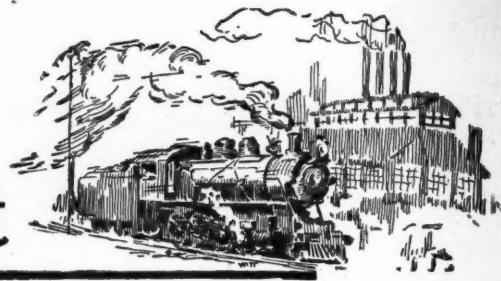
Another point being emphasized is that insufficient attention is being given return "cargo" for cars, in direct contrast with the careful consideration being given to return cargo for ships. While the car is a smaller unit and the haul is shorter, which makes the matter of empty transportation relatively less important than in the case of ocean carriers, yet it is held to be a matter of great importance which should concern coal operators, dealers and consumers, as well as the transportation companies. In that connection it also is pointed out that the railroads have been material contributors to overdevelopment in regions containing coal deposits. In their eagerness to obtain tonnage they have frequently disregarded the general economic effect of making possible the opening of new mines when there are too many already.

As this is written it seems certain that the amendments to the Coal Commission Act are lost. While it is possible to put through the appropriation on a Senate amendment, it is not practicable to attempt the handling of other Coal Commission legislation on that basis. The feeling is expressed, however, that penalties are not necessary to assure correct returns on the commission's questionnaires.

UNDER A BILL RECENTLY INTRODUCED, the State of Utah could take over and operate all Utah coal mines "in time of emergency," selling the coal to the people at cost, thus creating a fund from which mine owners would be reimbursed for all coal removed from their mines at the average price for the preceding year.



Production and the Market



Weekly Review

There is a feeling of easiness in the bituminous coal market. Here and there a better demand exists for various grades and in some instances there have been slight advances in prices, offset, however, by declines at other points. *Coal Age* Index is unchanged from last week, at 288. The corresponding spot price is \$3.49.

The severe cold weather general in all sections of the country last week slowed down transportation and sharpened demand. This combination of circumstances also held the market even.

Production of soft coal has dropped to a new level, being now around 10,500,000 net tons per week. Every prospect is for lower tonnages during March.

Price changes were more general in the high-volatile coals than in the low-volatile grades.

There are faint indications of foreign demand for smokeless coals because of the Ruhr situation and the steady advance in Welsh coal prices. These, however, are hardly to be relied upon to support any ambitious program of coal exports. Two vessels, one for Genoa and the other for Rotterdam, have been chartered for early March cargo loading.

While inquiries are being received here regarding shipments of coal to foreign countries, British coal to the amount of more than 32,000 tons was received in New York harbor during the week ended Feb. 24.

OPERATORS' QUOTE CONTRACT FIGURES

Operators are freely quoting contract figures and some contracts have been closed at figures ranging from \$3.25@\$4, with the majority of the tonnage covered at \$3.50@\$3.60. Consumers are not overanxious to close contracts for their next year's fuel supply and are doing so only when they feel comfortably sure that the spot market is not going lower than their contract figures.

In the Midwest steam coals are sluggish and hard to move while domestic demand was hardly sufficient to take care of the southern Illinois lump and stove sizes.

The bottom was kept from dropping out of the domestic situation by the transportation situation.

A peculiar situation existed in the Northwest during the past week. While bituminous coal at the Head-of-the-Lakes was going down in price from 50 to 75c. there was a scarcity of coal around Milwaukee along with snowstorms which hindered rail movement. Duluth dock men, having considerable coal on hand, begun shading prices to avoid an expensive carry-over, excepting lake shipments to bring in coal at a lower figure than the cost of the coal on hand.

At the request of Fuel Distributor Wadleigh, the Navy and the Army has sent tugs to Boston and other New England ports to act as ice breakers to permit the entry of coal barges. Telegraphic advices to Mr. Wadleigh on Feb. 27 indicated that coal barges now can move freely to New England destinations.

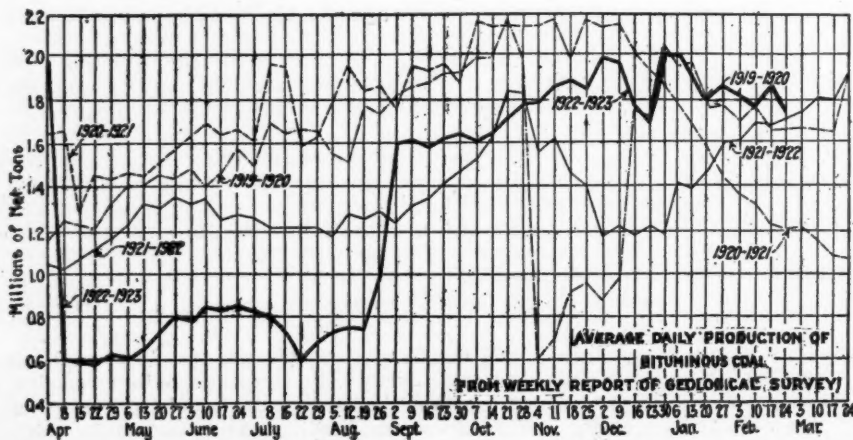
BRISK DEMAND AT BIRMINGHAM

One of the bright spots in the country is at Birmingham, Ala., where there is a brisk demand for domestic coal due to cold weather. Yards have been entirely cleared of stocks although production is on a basis of around 385,000 net tons per week and car supply ranges from 50 to 60 per cent of requirements.

An ample supply of smokeless coals at the Virginia terminals resulted in a softened market. There was an improvement in coastwise shipments and in the bunker trade. Dumpings, however, were 98,352 net tons less in the week ended Feb. 22 than in the previous week.

The coldest weather of this winter had no appreciable effect on soft coal in the East. Supplies remained sufficient to meet requirements. Heavy ice hampered transportation along the eastern coast from New York to New England and for several days only the larger vessels were able to make deliveries.

The anthracite market is active and domestic sizes moved easily. The smaller operators who a few weeks



Estimates of Production

(Net Tons)

BITUMINOUS

	1922	1923
Feb. 3.....	9,714,000	10,686,000
Feb. 10 (b).....	10,309,000	10,725,000
Feb. 17 (a).....	10,285,000	10,549,000
Daily average.....	1,714,000	1,758,000
Coal year to date.....	369,949,000	356,664,000
Daily average coal year.....	1,365,000	1,314,000

ANTHRACITE

Feb. 3.....	1,811,000	2,056,000
Feb. 10.....	1,822,000	2,023,000
Feb. 17.....	1,703,000	1,828,000
Coal year to date.....	78,122,000	44,582,000

COKE

Feb. 10 (b).....	128,000	359,000
Feb. 17 (a).....	135,000	382,000
Calendar year.....	840,000	2,392,000

(a) Subject to revision. (b) Revised from last report.

ago reduced their prices from around \$13@14.50 because of the cancellation of orders due to mild weather have gone back to their former prices.

Stocks of anthracite at the Head-of-the-Lakes are now down to 15,000 tons, with the supply going to dealers in small shipments. There were 2,825 cars of bituminous coal and 3,632 cars of anthracite forwarded to New England through the principal gateways over the Hudson River and through Rouses Point during the week ended Feb. 17, as reported by the American Railway Association. This was 4 cars less of anthracite and 636 cars less of bituminous coal than the previous week.

The spot furnace coke market has stiffened. There was a fair volume of buying by consumers while one producing interest has been in the market for coke to apply on its delivery obligations.

"The total soft coal raised during the week ended Feb. 17 is estimated at 10,549,000 net tons, a decline of 239,000 tons from the revised estimates of 10,788,000 for the week preceding," says the U. S. Geological

Survey. "Early returns on car loadings in the present week show 39,280 cars loaded on Monday, 30,177 on Tuesday, and 31,392 on Wednesday, thus indicating a rate of production lower than in the week before and a probable total output of from 10,200,000 to 10,400,000 tons."

Midwest Steam Trade Drags

Field and railroad conditions during the past week in the Chicago region were such that steam coals from any territory were sluggish and difficult to move. Domestic demand was barely enough to absorb the best-known and most widely advertised lump and stove sizes from southern Illinois throughout the Chicago and Northwest market region, leaving the others to hunt for buyers. Around St. Louis the cheaper grades of domestic coals from the Standard district were the ones that moved most easily, though the usual steady call for high-grade Mt. Olive lump continued fairly evenly. This movement of domestic sizes brought so much fine coal into transit that screenings everywhere softened. Even Franklin County screenings required pushing at \$2.25, the lowest listed price. Association operators held to that minimum as closely as possible, but it was a hard struggle

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Feb. 27 1922	Feb. 12 1923	Feb. 19 1923	Feb. 26 1923†
Smokeless lump.....	Columbus....		\$3.25	\$7.00	\$7.00	\$6.50@ \$7.50
Smokeless mine run....	Columbus....		2.15	4.75	4.35	4.25@ 4.75
Smokeless screenings....	Columbus....		1.40	4.75	4.35	4.25@ 4.65
Smokeless lump.....	Chicago....		3.15	7.00	7.00	6.75@ 7.25
Smokeless mine run....	Chicago....		2.15	4.75	4.75	4.00@ 5.00
Smokeless lump.....	Cincinnati....		3.15	7.10	7.25	7.00@ 8.00
Smokeless mine run....	Cincinnati....		1.75	4.75	4.75	4.50@ 5.00
Smokeless screenings....	Cincinnati....		1.15	4.50	5.00	4.00@ 4.25
*Smokeless mine run....	Boston....		4.60	7.15	6.70	6.10@ 6.35
Clearfield mine run....	Boston....		1.95	3.85	3.85	3.50@ 4.00
Cambria mine run....	Boston....		2.45	4.50	4.50	4.00@ 4.75
Somerset mine run....	Boston....		1.90	4.10	4.10	3.75@ 4.25
Pool 1 (Navy Standard)....	New York....		3.00	5.25	4.80	4.50@ 5.00
Pool 1 (Navy Standard)....	Philadelphia....		3.05	5.10	4.80	4.55@ 4.90
Pool 1 (Navy Standard)....	Baltimore....		2.70	4.60		
Pool 9 (Super. Low Vol.)....	New York....		2.40	4.60	4.00	3.50@ 4.25
Pool 9 (Super. Low Vol.)....	Philadelphia....		2.45	4.60	4.35	4.10@ 4.40
Pool 9 (Super. Low Vol.)....	Baltimore....		2.40	4.35	3.60	3.50
Pool 10 (H.Gr. Low Vol.)....	New York....		2.00	4.10	3.70	3.25@ 3.75
Pool 10 (H.Gr. Low Vol.)....	Philadelphia....		2.10	4.10	3.70	3.50@ 3.75
Pool 10 (H.Gr. Low Vol.)....	Baltimore....		2.10	4.00	3.25	3.25
Pool 11 (Low Vol.)....	New York....		1.75	3.35	2.90	2.70@ 3.15
Pool 11 (Low Vol.)....	Philadelphia....		1.75	3.10	3.15	2.90@ 3.25
Pool 11 (Low Vol.)....	Baltimore....		1.85	3.00	2.65	2.60
High-Volatile, Eastern						
Pool 54-64 (Gas and St.)....	New York....		1.50	2.95	2.60	2.10@ 2.40
Pool 54-64 (Gas and St.)....	Philadelphia....		1.50	2.95	2.75	2.35@ 2.60
Pool 54-64 (Gas and St.)....	Baltimore....		1.40	2.85	2.45	2.65
Pittsburgh sc'd gas....	Pittsburgh....		2.65	4.10	4.10	4.00@ 4.25
Pittsburgh mine run (St.)....	Pittsburgh....		2.15	2.75	2.75	2.75
Pittsburgh slack (Gas)....	Pittsburgh....		1.65	3.25	2.85	2.75@ 2.85
Kanawha lump....	Columbus....		2.55	4.50	4.30	4.00@ 5.00
Kanawha mine run....	Columbus....		1.60	2.60	2.60	2.75@ 3.00
Kanawha screenings....	Columbus....		1.40	2.35	2.35	2.35@ 2.60
W. Va. lump....	Cincinnati....		2.25	4.25	4.25	4.50@ 5.00
W. Va. Gas mine run....	Cincinnati....		1.85	2.60	3.35	2.75
W. Va. Steam mine run....	Cincinnati....		1.40	2.60	3.35	2.60
W. Va. screenings....	Cincinnati....		1.30	2.25	2.35	2.25@ 2.50
Hooking lump....	Columbus....		2.55	4.50	4.25	3.85@ 4.75
Hooking mine run....	Columbus....		1.90	2.50	2.50	2.50@ 2.75
Hooking screenings....	Columbus....		1.50	2.10	2.10	1.90@ 2.35
Pitts. No. 8 lump....	Cleveland....		3.10	4.20	4.25	4.00@ 4.75
Midwest						
Pitts. No. 8 mine run....	Cleveland....		\$2.00	\$3.15	\$3.20	\$3.75@ \$4.00
Pitts. No. 8 screenings....	Cleveland....		1.80	3.10	3.10	2.85@ 3.00
Franklin, Ill. lump....	Chicago....		3.25	5.35	4.60	4.50@ 4.75
Franklin, Ill. mine run....	Chicago....		2.50	3.85	3.35	3.25@ 3.50
Franklin, Ill. screenings....	Chicago....		2.00	2.55	2.55	2.25@ 2.50
Central, Ill. lump....	Chicago....		3.00	3.60	3.35	3.25@ 3.50
Central, Ill. mine run....	Chicago....		2.35	2.60	2.60	2.50@ 2.75
Central, Ill. screenings....	Chicago....		1.80	1.60	1.60	1.50@ 1.75
Ind. 4th Vein lump....	Chicago....		3.25	4.35	4.35	4.25@ 4.50
Ind. 4th Vein mine run....	Chicago....		2.50	3.10	3.10	3.00@ 3.25
Ind. 4th Vein screenings....	Chicago....		2.00	2.30	2.10	2.00@ 2.25
Ind. 5th Vein lump....	Chicago....		2.90	3.60	3.60	3.50@ 3.75
Ind. 5th Vein mine run....	Chicago....		2.25	2.60	2.60	2.50@ 2.75
Ind. 5th Vein screenings....	Chicago....		1.75	1.80	1.80	1.75@ 1.85
Standard lump....	St. Louis....		2.60	3.10	3.10	3.00@ 3.25
Standard mine run....	St. Louis....		1.95	2.25	2.25	2.25
Standard screenings....	St. Louis....		1.10	1.45	1.45	1.40@ 1.50
West Ky. lump....	Louisville....		2.65	3.85	3.35	3.25@ 3.50
West Ky. mine run....	Louisville....		1.85	2.35	2.05	2.00@ 2.40
West Ky. screenings....	Louisville....		1.80	2.10	1.85	1.75@ 2.00
West Ky. lump....	Chicago....			3.85	3.60	3.50@ 3.75
West Ky. mine run....	Chicago....			2.00	1.95	1.90@ 2.00
South and Southwest						
Big Seam lump....	Birmingham....		2.60	3.95		
Big Seam mine run....	Birmingham....		1.85	2.35	2.10	2.00@ 2.25
Big Seam (washed)....	Birmingham....		1.85	2.60	2.60	2.50@ 2.75
S. E. Ky. lump....	Chicago....			4.85	4.60	4.50@ 4.75
S. E. Ky. mine run....	Chicago....			2.85	2.85	2.75@ 3.00
S. E. Ky. lump....	Louisville....			2.55	5.25	4.75
S. E. Ky. mine run....	Louisville....			1.55	2.60	2.25@ 3.00
S. E. Ky. screenings....	Louisville....			1.35	2.35	2.00@ 2.40
S. E. Ky. lump....	Cincinnati....			2.35	4.25	4.00
S. E. Ky. mine run....	Cincinnati....			1.75	2.35	2.60
S. E. Ky. screenings....	Cincinnati....			1.15	2.10	2.35
Kansas lump....	Kansas City....			5.00	5.00	5.00
Kansas mine run....	Kansas City....			4.00	3.50	3.50
Kansas screenings....	Kansas City....			2.50	2.50	2.50

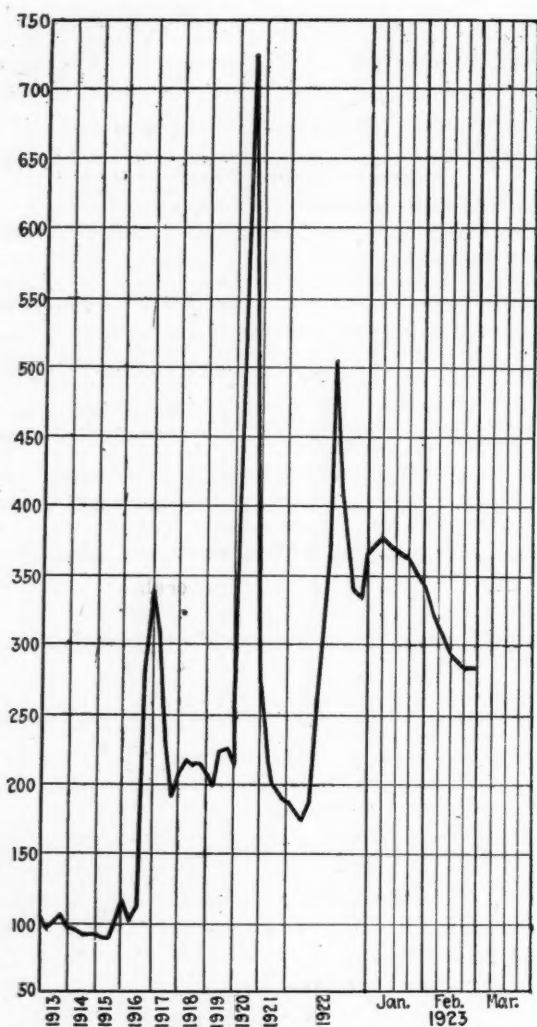
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

Market Quoted		Freight Rates	Latest Independent	Pre-Strike Company	Feb. 19, 1923 Independent	Feb. 19, 1923 Company	Feb. 26, 1923 Independent	Feb. 26, 1923 Company
Broken.....	New York....	\$2.34		\$7.60@ \$7.75	\$9.00	\$7.75@ \$8.25	\$9.00	\$7.75@ \$8.25
Broken.....	Philadelphia....	2.39	\$7.00@ \$7.50	7.75@ 7.85		7.90@ 8.10		7.90@ 8.10
Egg.....	New York....	2.34	7.60@ 7.75	7.60@ 7.85	9.25@ 12.00	8.00@ 8.35	9.25@ 12.00	8.00@ 8.35
Egg.....	Philadelphia....	2.39	7.25@ 7.75	7.75	9.25@ 11.00	8.10@ 8.35	9.25@ 11.00	8.10@ 8.35
Egg.....	Chicago....	5.09	7.50	8.25	12.00@ 12.50	7.20@ 8.25	12.00@ 12.50	7.20@ 8.25
Stove.....	New York....	2.34	7.90@ 8.20	7.90@ 8.10	9.25@ 12.00	8.00@ 8.35	9.25@ 12.00	8.00@ 8.35
Stove.....	Philadelphia....	2.39	7.85@ 8.10	8.05@ 8.25	9.25@ 11.00	8.15@ 8.35	9.25@ 11.00	8.15@ 8.35
Stove.....	Chicago....	5.09	7.75	8.25	12.00@ 12.50	7.35@ 8.25	12.00@ 12.50	7.35@ 8.25
Chestnut.....	New York....	2.34	7.90@ 8.20	7.90@ 8.20	9.25@ 12.00	8.00@ 8.35	9.25@ 12.00	8.00@ 8.35
Chestnut.....	Philadelphia....	2.39	7.85@ 8.10	8.05@ 8.15	9.25@ 11.00	8.15@ 8.35	9.25@ 11.00	8.15@ 8.35
Chestnut.....	Chicago....	5.09	7.75	8.25	12.00@ 12.50	7.35@ 8.35	12.00@ 12.50	7.35@ 8.35
Range.....	New York....	2.34				8.25		8.25
Pea.....	New York....	2.22	5.00@ 5.75	5.75@ 6.45	7.50@ 11.00	6.15@ 6.30	7.50@ 11.00	6.15@ 6.30
Pea.....	Philadelphia....	2.14	5.50@ 6.00	6.10@ 6.25	7.00@ 9.00	6.15@ 6.20	7.00@ 9.00	6.15@ 6.20
Pea.....	Chicago....	4.79	6.00	6.25	7.00@ 8.00	5.49@ 6.03	7.00@ 8.00	5.49@ 6.03
Buckwheat No. 1....	New York....	2.22	2.75@ 3.00	3.50	4.50@ 5.50	4.00@ 4.10	4.50@ 5.25	4.00@ 4.10
Buckwheat No. 1....	Philadelphia....	2.14	2.75@ 3.25	3.50	5.00@ 5.50	4.00	4.00@ 5.00	4.00
Rice.....	New York....	2.22	2.00@ 2.50	2.50	2.25@ 3.00	2.75@ 3.00	2.25@ 3.00	2.75@ 3.00
Rice.....	Philadelphia....	2.14	2.00@ 2.50	2.50	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00
Barley.....	New York....	2.22	1.50@ 1.85	1.50	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
Barley.....	Philadelphia....	2.14	1.50@ 1.75	1.50	1.50@ 2.00	2.00	1.40@ 2.00	2.00
Barley.....	New York....	2.22		2.00@ 2.50		2.10		2.10

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index 288. Week of Feb. 26, 1923. Average spot price for same period, \$3.49. This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the U. S. weighted in accordance first with respect to the proportions each of slack, prepared tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913, 1918," published by the Geological Survey and the War Industries Board.

in the face of Williamson and Saline County competition at \$2.

The only thing that kept the bottom from dropping out of even the domestic market was the transportation situation. Congestion at the Toledo, Louisville and Cincinnati gateways held back a good deal of Eastern coal that eventually will reach the Chicago district, thus throwing the market open to Illinois mines. Car supply there permitted not to exceed three days' running time in most southern Illinois mines and only four days in central Illinois. Standard district and Mt. Olive mines east and northeast of St. Louis were lucky to get as much as 2½ days.

Louisville Feels Blockade Effects

The railroad congestion around Louisville, which is making itself felt throughout the whole Middle West, is laid largely to the Kentucky & Indiana Terminal R.R. The inability of that carrier to clear its connections with both Northern and Eastern lines piled up loads back along the routes to the mines and prevented empties from returning to the fields so that the Louisville & Nashville embargoed Louisville early in the week. A good deal of this confusion was clearing along toward the end of the week, but it is expected that several days will elapse before coal can get into good flow again.

Demand general throughout Kentucky is poor. The cold weather of a week ago has softened and with it prices have

grown limber again on practically every kind of coal, in spite of the rail congestion. Domestic demand was keen for a short while but nothing could be sold that had not left the mines. Dealers took enough to save transit domestic coal from distress and steam consumers bought steadily if sparingly.

Some of the blame for the slowness of movement off the docks is laid to Illinois and Indiana competition. Southern Illinois coal can be laid down in southern Minnesota and the eastern end of the Dakotas for \$8.75@9. It costs \$11.15 at present freight rates, dock men say, to deliver Eastern coal from the docks to the same markets. Hence the strong efforts of the dock interests just now to push their case before the Interstate Commerce Commission for an equalization of rates inland from the Lakes.

Kansas Steam in Some Demand

The fact that dealers in Kansas City and the surrounding territory are still overstocked with coal has shortened the market for domestic sizes, further reduced the production at mines and thus cut down steam coal supply to a point where the standard level of \$2.50 shows signs of rising to \$2.75. The rise in fuel oil prices is making a railroad or two begin to eye coal with respect once more, coal salesmen say. Inquiries are coming in from that source.

Mines in Utah are working a little more than half time and operators are easily marketing all the lump production. Small sizes, however, are sluggish and price cutting has begun. Though domestic sizes move out readily, operators are carefully watching the credit of dealers and consumers in farming communities where financial conditions are not good. Car supply is adequate. There is no labor trouble in the state worthy of the name.

In Colorado car supply is sufficient to keep work time at the mines so high that the market is steadily flooded again with both bituminous and lignite fuels. Two days a week running time more than fills the requirements. Canon City and Walsenburg lump sells for \$6 and nut for \$5.50. Trinidad lump is quoted at \$5.50; nut, \$5, and mine-run, \$4.50. Lignite lump moves slowly at \$3@3.50.

Ohio Retailers Seek Larger Shipments

With cold weather and car supply poorer Ohio retail dealers are in the market for larger shipments and steam-coal consumers are buying better. On the whole the tendency is upward. Retail stocks around Columbus are exhausted in many instances. Shipments ordered a month or so back have not yet arrived and dealers are not anxious to buy more coal, fearing the shipments will arrive at about the same time. Public institutions, schools and hospitals are in the market for additional stocks and utilities and railroads are buying heavily.

The Cincinnati market has been stabilized by embargoes to the North and bad car supply. The Louisville & Nashville embargo against deliveries to the lines North still holds good. The Grand Rapids & Indiana at Richmond, Ind., is still tight and the Big Four is in bad shape. The jam on the B. & O. is due to the congestion that does not seem breakable at Toledo. The Chesapeake & Ohio is in bad shape because of the lowered supply of empties to the mines.

Output of eastern Ohio mines during the week ended Feb. 17 was 309,000 tons, an increase of 21,000 tons over the preceding week. The mines are unable to work more than 35 to 40 per cent of capacity because of car shortage.

Retail dealers in Cleveland are in the market for lump sizes. They have considerable difficulty in procuring smokeless fuel from West Virginia and eastern Kentucky and anthracite is particularly scarce. The delivered prices for Pocahontas is about \$14, and for anthracite from \$18 to \$19.

Receipts of bituminous coal at Cleveland during the week ended Feb. 17 were 2,733 cars, an increase of 88 cars over the preceding week. Of this tonnage 2,103 cars were consigned to industries and 630 cars to retail yards. Average weekly receipts during the first quarter of 1923 up to Feb. 17 were 2,861 cars per week, as compared with 2,345 cars per week during the last quarter of 1922.

In West Virginia as a whole the car supply is not over 30 per cent. In some sections railroad fuel mines are

obtaining the bulk of the supply. Though not so many cars are being ordered since market conditions and lower prices have eliminated many small mines from the market, companies still loading and shipping are not able to obtain enough cars to take care of orders.

Cars Scarce in Central Pennsylvania

In the Pittsburgh and central Pennsylvania districts car shortage is being seriously felt. In the Pittsburgh region there is little demand in the open market and the cold weather seems to have had little effect upon demand for lump coal. The operators in central Pennsylvania also are suffering because of poor car supply, which is about 20 per cent on both the Pennsylvania and New York Central railroads.

Operators along the New York Central are able to get on an average 25c. per ton more for their coal than those on other roads because of their ability to make shipments into New England.

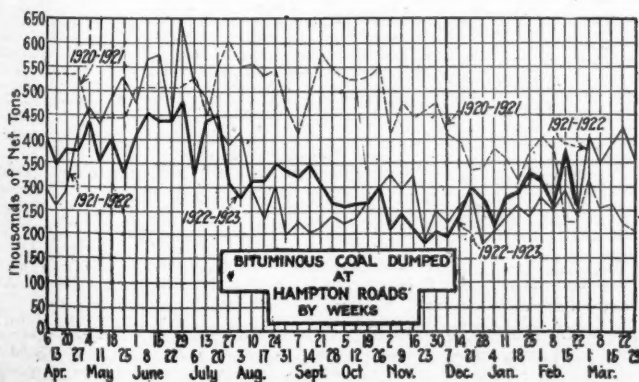
Steam Receipts Light at Boston

Receipts of bituminous steam grades in Boston have continued extremely light. Embargoes have continued in effect against the Hudson River gateways, especially from connecting lines, and by the water route also transportation has been seriously delayed. A long period of steady cold has caused ice to form in many of the small harbors and particularly on the shoals back of Cape Cod. Barges and certain of the steamers have been held up for days at a time, and even the approaches to the Cape Cod Canal have been so blocked with ice that few boats have come through during the past week. In consequence there has been a mild shortage of bituminous coal to meet current requirements. There has been more or less borrowing on that account, and at the rehandling wharves for inland delivery there has been a sufficient shortage of cars to advance spot prices to the high mark of several weeks ago. At the same time certain of the large factors have based their quotations on the market at Hampton Roads and in such cases the price level has not been above \$9.50 per gross ton on cars.

There have been instances where Navy acceptable Pocahontas and New River have been sold quietly at close to \$6 per gross ton f.o.b. vessel, but the average probably would be around \$6.25. This nets better than \$3.50 per gross ton at the mines, and the trade is much interested to see whether during March spot quotations will go lower.

Meanwhile this territory is being diligently canvassed for next season's business. So far we have heard no prices beyond those quoted by one or two operators for April coal but it is quite likely there will be developments in this direction during the next fortnight. Large consumers here are by no means eager to make contracts; there have even been buyers who have cancelled purchases made in December, for the reason that they have comfortable reserves for the present and are looking for lower prices when next they enter the market. Oil has made such inroads with some of the mills that together with water power, which soon must be reckoned with, buyers of this kind feel they can afford to wait developments on coal until they can get a better line on the market.

Several large operations in central Pennsylvania show only a light output because of short car supply, restricted destinations and local differences with labor. February ton-



nage was very light with most producers, and in spite of the shortage of anthracite, which has perhaps been more acute in New England than at any time thus far, there has been no urgent demand for bituminous coal even by routes that are open.

At New York weather conditions influenced the market. Prices changed frequently and at the end of the week showed a slight decrease from the previous week. There were 2,841 cars at the local terminals on Feb. 23, as compared with 2,372 cars on Feb. 16.

The market at Philadelphia has been stabilized by weather conditions. Concerns interested in the export trade report no particular activity either in bunkering or tide coal. They are, however, watching the European situation.

Agents and mine representatives in Baltimore are forced to work hard to obtain orders to make a good showing in bulk.

The bituminous situation in Buffalo is a trifle better because of the cold weather. The large amount of coal on tracks has been nearly cleared up, as shippers thought it would be cheaper to sell it at a sacrifice than pay demurrage charges.

Anthracite

Demand for the anthracite domestic coals continues strong. The New York market was seriously affected by heavy ice in New York Bay and adjacent rivers and more than 10,000 tons of coal was lost through barges being sunk.

Weather conditions at Baltimore affected the anthracite business. Demand increased and the receipts were picked up as quickly as they arrived.

"The production of anthracite in the week ended Feb. 17 declined to 1,828,000 net tons, including mine fuel, local sales and dredge and washery output," says the Geological Survey. "Save for the holiday weeks (Thanksgiving, Christmas and New Year's); this is the first time since mid-November that the weekly production has fallen below 2,000,000 tons. Labor troubles and transportation disability on account of bad weather were causes of the decline and make it impossible to forecast the present week's output."

How the Coal Fields Are Working

Percentages of full-time operation of bituminous coal mines, by fields, as reported by the U. S. Geological Survey in Table V of the Weekly Report.

	Jan. 1 to April 1, 1922 Inclusive	Sept. 5 to Dec. 30, 1922 Inclusive	Jan. 1 to Feb. 10, 1923 Inclusive	Week Ended Feb. 10, 1923
U. S. Total.....	55.7	84.7	89.5	(a)
Alabama.....	64.6	84.7	89.5	(a)
Somerset County.....	74.9	36.3	30.7	(a)
Panhandle, W. Va.....	51.3	57.3	55.3	56.5
Westmoreland.....	58.8	65.8	57.4	51.2
Virginia.....	59.9	55.7	53.2	52.8
Harlan.....	54.8	22.1	22.4	24.6
Hazard.....	58.4	16.4	20.2	18.5
Pocahontas.....	60.0	36.6	37.4	37.9
Tug River.....	63.7	28.8	33.5	35.4
Logan.....	61.1	26.2	31.2	32.8
Cumberland-Piedmont.....	50.6	31.7	45.0	(a)
Winding Gulf.....	64.3	30.4	33.0	30.6
Kenova-Thacker.....	54.3	42.4	38.7	34.0
N. E. Kentucky.....	47.7	28.4	27.9	(a)
New River.....	37.9	31.6	34.9	34.8
Oklahoma.....	59.6	59.1	40.8	53.2
Iowa.....	78.4	75.9	78.9	77.0
Ohio, Eastern.....	46.6	40.8	33.8	33.5
Missouri.....	66.8	76.3	76.4	75.3
Illinois.....	54.5	49.9	52.9	49.1
Kansas.....	54.9	55.9	52.0	48.2
Indiana.....	53.8	37.7	54.6	54.4
Pittsburgh†.....	39.8	41.2	32.7	25.3
Central Pennsylvania.....	50.2	53.4	42.8	45.5
Fairmont.....	44.0	35.5	37.6	34.5
Western Kentucky.....	37.7	32.4	34.2	31.6
Pittsburgh*.....	31.9	56.1	65.0	55.6
Kanawha.....	13.0	15.6	21.5	23.4
Ohio, Southern.....	24.3	38.1	36.9	31.9

* Rail and river mines combined.

† Rail mines.

(a) No report.

Car Loadings, Surplusages and Shortages

	Cars Loaded			
	All Cars	Coal Cars		
Week ended Feb. 10, 1923.....	853,289	190,860		
Previous week.....	865,675	189,773		
Same week in 1922.....	777,791	192,789		
	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
Feb. 7, 1923.....	28,628	7,790	70,269	37,626
Jan. 31, 1923.....	26,588	7,208	73,269	38,477
Same date in 1922.....	296,659	81,592		

Foreign Market And Export News

Demand for British Coal for Export Strong; Production Slightly Lower

Production of British coal for the week ended Feb. 10 was 5,567,000 tons, says a cable to *Coal Age*. This was 34,000 tons below the previous week's production and the smallest output for any week this year.

There is a strong demand in the South Wales market which has resulted in stronger prices for some coals.

Inquiries for coal for export are heavy. Germany is looking for all classes of fuel, especially cooking coals and coke. Italy, France and Belgium are reported as heavy buyers.

The German pressure on the Newcastle and Hull markets is excessive, and in response to urgent inquiries and offers to pay in sterling very large sales have been effected alike for prompt and forward shipment. While these sales cover every class of coal, they consist mostly of Durham coking unscreened and steam smalls. In some cases the German industrialists are sending their own boats across the North Sea.

The greatly increased export demand for foundry and furnace cokes sent these brands well up, and it was accompanied by a great improvement, from home sources due to the better outlook in the iron trade. France and Belgium are in need of prompt supplies, and have sent numerous inquiries into the market for industrial fuels, including coke. Italy and the Continental railway and gas works are coming forward with their requirements. The output is large, but is not large enough to meet the demand.

The Ruhr crisis is responsible for increased exports to France and Italy. Exports to Italy are on a higher level than for some time. From forty to fifty steamers are waiting for loadings at the various ports. Within the last month 85,000 tons of coal has been sold to Germany. There is an appreciable quantity of Welsh coal going to India and Egypt.

Stinnes has been soliciting Welsh coal, but has declined offers because of the high prices asked. The north of England market is firm.

French Mines Production Increasing

Production is rapidly increasing in the mines of the Nord and Pas de Calais as is shown by the following tabulation in metric tons:

	Coal	Coke	Briquets
In 1913....	29,618,997	2,445,050	1,802,286
In 1921....	13,554,028	387,245	1,042,928
In 1922....	15,379,566	539,889	1,406,940

That the work of reconstruction is going on rapidly in the devastated collieries is indicated by the following comparative figures showing production in January and December of last year:

PRODUCTION IN DEVASTATED MINES OF THE DEPARTMENT OF PAS DE CALAIS

	(In Metric Tons)	Jan., 1922	Dec., 1922
Coal		227,578	354,584
Coke		0	3,035
Briquets		29,940	25,162

PRODUCTION IN DEVASTATED MINES OF THE DEPARTMENT OF DU NORD

	(In Metric Tons)	Jan., 1922	Dec., 1922
Coal		353,148	379,652
Coke		5,988	27,449
Briquets		84,871	92,825

Hampton Roads Movement Brisk

Movement at Hampton Roads has been brisk, the holiday intervening, however, to cut down the volume. Coastwise shipments have shown a decided improvement and the bunker trade also has taken the upgrade.

The tone of the market grew firmer, with prices apparently halted in their downward trend. Shippers look forward to an early entry into the export field if conditions continue to improve.

Movement of coal to port increased, some improvement in the car situation being noted. The effect of the recent storm in delaying shipping and holding back movement was being eliminated and piers were making up the time lost in this manner. The outlook was brighter than for several weeks.

American Gas Coal for Germany

Firms in Hamburg, Germany, are reported to have purchased several cargoes of American gas coal and inquiries concerning further deliveries from the United States are said to have increased as a result of advancing prices for British coal.

It was also said that English coal firms are negotiating for the lease of dock space at Hamburg in order to lay in large stocks of bunker coal.

Official German statistics made public show that German reparations coal amounting to 1,587,026 tons have been exported from France and Belgium in fifty-nine specific instances during the last two years. It is stated that at least twenty-three offers of this coal were made in neutral countries, and even in Germany. In fifteen of these offers some 200,000 tons, besides 1,042 carloads, were tendered. In at least one instance, according to the statement, the coal was advertised through the newspapers in a neutral country.

Export Clearances, Week Ended Feb. 17, From Hampton Roads

FROM HAMPTON ROADS	
For Cuba:	Tons
Br. S.S. Darnholme, for Havana.....	5,654
Br. SS. Berwindale, for Havana.....	7,715
Dan. SS. Aabenraa, for Havana.....	3,180
For Italy:	
Ital. SS. Anna Dminak, for Genoa....	9,353
FROM PHILADELPHIA	
For Cuba:	
Dan. SS. Jan, for Havana.....	
Nor. SS. H. C. Flood, for Havana.....	
For Porto Rico:	
Br. SS. Carib, for San Juan.....	

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.	Feb. 15	Feb. 22
Cars on hand.....	1,013	1,287
Tons on hand.....	64,679	88,242
Tons dumped for week.....	98,848	88,096
Tonnage waiting.....	3,575	35,400
Virginian Ry. piers, Sewalls Pt.		
Cars on hand.....	1,420	1,542
Tons on hand.....	83,670	89,370
Tons dumped for week.....	119,021	63,021
Tonnage waiting.....	13,251	9,226
C. & O. piers, Newport News		
Cars on hand.....	1,509	1,323
Tons on hand.....	79,790	72,835
Tons dumped for week.....	105,269	84,207
Tonnage waiting.....	24,311	6,110

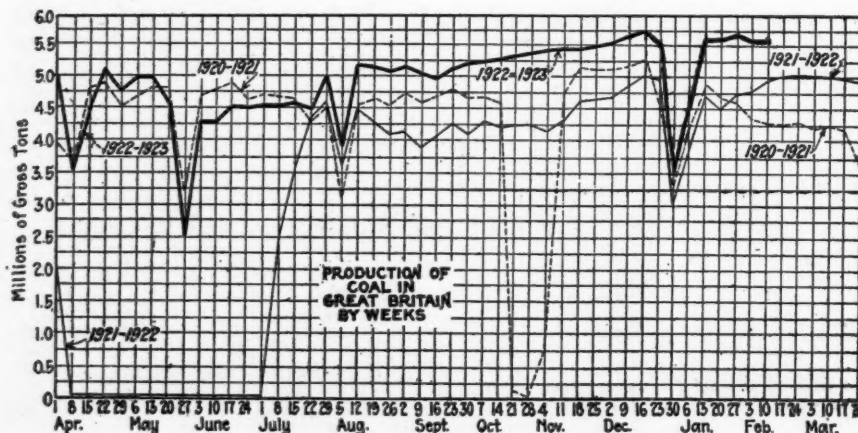
Pier and Bunker Prices, Gross Tons

PIERS		
	Feb. 17	Feb. 24†
Pool 9, New York.....	\$7.25@7.50	\$7.25@7.50
Pool 10, New York.....	6.50@7.00	6.50@6.75
Pool 11, New York.....	5.75@6.25	5.60@6.00
Pool 9, Philadelphia.....	7.00@7.25	6.95@7.15
Pool 10, Philadelphia.....	6.50@6.75	6.35@6.65
Pool 11, Philadelphia.....	5.65@6.15	5.55@6.00
Pool 1, Hamp. Rds.....	6.25@6.50	6.25@6.50
Pool 5-6-7 Hamp. Rds.....	6.40	6.25
Pool 2, Hamp. Rds.....	6.25@6.50	6.25@6.50
BUNKERS		
Pool 9, New York.....	\$7.65@7.90	\$7.50@7.90
Pool 10, New York.....	6.90@7.40	6.80@7.25
Pool 11, New York.....	6.15@6.65	5.80@6.60
Pool 9, Philadelphia.....	7.30@7.60	7.15@7.60
Pool 10, Philadelphia.....	6.85@7.10	6.70@6.95
Pool 11, Philadelphia.....	6.00@6.40	5.90@6.35
Pool 1, Hamp. Rds.....	6.50	6.50
Pool 2, Hamp. Rds.....	6.50	6.50

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to Coal Age		
	Feb. 17	Feb. 24†
Admiralty, large.....	29s. @ 29s. 6d.	29s. @ 29s. 6d.
Steam, smalls.....	19s. @ 21s.	22s. 6d.
Newcastle:		
Best steams.....	28s.	28s. 6d. @ 30s.
Best gas.....	27s. @ 28s.	29s. @ 30s.
Best bunkers.....	25s. 6d.	28s. @ 32s. 6d.

† Advances over previous week shown in heavy type; declines in italics.



News Items From Field and Trade

ALABAMA

The Scott & Jones Cahaba Red Ash Coal Co. has been incorporated in Birmingham with a capital stock of \$5,000. W. A. Scott, B. F. Jones and D. H. Jones are incorporators of the new company.

ILLINOIS

Illinois coal operators on Feb. 20 conferred in Chicago with Henry L. Stimson and Goldthwaite Dorr, attorneys for the bituminous operators before the United States Coal Commission. They reviewed the situation as it affects operators through the Commission. Mr. Stimson and Mr. Dorr had met the operators of Ohio the previous day. From Chicago they made a short trip into Midwestern coal fields with George B. Harrington, intending to return to Washington by the 24th.

James G. Monohan, of Chicago, has been appointed manager of the Peabody Coal Co. interests in Springfield. He succeeds the late Alfred G. Halle. Mr. Monohan formerly managed the Peabody interests at Buffalo and for several years was attached to the Chicago office.

A new effort is on foot in the Illinois Legislature to enact a bill taxing coal production at the rate of 8c. a ton. At two previous sessions of the Legislature similar tonnage tax bills have been defeated, both operators and miners uniting against them on the ground that they are discriminatory, since they covered only one industry. The bill filed this year was introduced by Representative G. J. Johnson, of Ford County, a region which produces no coal.

A new mine is being located near old Lake Creek, three miles southeast of Johnston City, by the St. Louis Chemical Co. A switch is being laid to the site of the new mine. This is the first of three new mines which will be located east of Johnston City.

The Byproducts Coke Corporation, of Chicago, reports net earnings of \$255,152 for 1922, against a net operating loss of \$1,295,235 in 1921.

Gunplay and murder were described as daily occurrences in the coal field towns of southern Illinois by Representative Myers of Franklin County in a speech to a committee of the Illinois Legislature Feb. 21. Mr. Myers was speaking for his bill to regulate the sale and carrying of one-hand guns. "Down where I come from," he told the committee, "murders are so frequent that the local papers pay no more attention to them than they do to weddings."

The fate of the state police bill is doubtful on the floor of the Illinois House. The bill has been reported out of the Military Affairs Committee but is encountering stiff labor resistance.

E. P. Stewart has joined the engineering staff of Allen & Garcia of Chicago and will specialize in the design and construction of coal washeries for that company. Mr. Stewart has been with Roberts & Schaefer, of Chicago.

Forty-nine mines in southern Illinois on five railroads serving that district have worked on an average two days a week since the miners' strike, according to figures issued by the Coal Operators' Association of the Fifth and Ninth Districts of Illinois. The statement is made that the loss in working time is due mainly to failure of railroads to supply cars. From Sept. 4 to Jan. 27 twenty-one mines on the Illinois Central worked 38.55 per cent of the time, lost 51.09 per cent of the time on account of no cars and 10.36 per cent due to other causes. Mines on the Louisville & Nashville, Baltimore & Ohio, Mobile & Ohio and Southern railroads showed about the same general averages.

Because of the congested traffic conditions in coal movements through the Duquoin yards, the Illinois Central R.R. is making preparations to construct a cut-off which will connect the Eldorado branch with the main line and the St. Louis line direct, eliminating the hauling of coal from Franklin County through the Duquoin yards. Company engineers have already surveyed the proposed cut-off and it is expected that work will be started on the job soon.

Indications are that large coke ovens may be installed at Zeigler soon under the own-

ership of the newly formed Zeigler Coal & Coke Co. of that town. At the time the new concern incorporated it was announced that only a new mine was to be opened by the company, but later reports are that 1,600 acres of additional land has been obtained by the company for the purpose of erecting large coke ovens. The stockholders of the new company, E. A. Bronson, Frank M. Wakefield and William J. Warr, are all closely connected with Joseph Leiter, now of Chicago, whose Zeigler properties are operated under a long lease by Bell & Zoller.

Damage which amounted to more than \$4,000 was done recently to the tippie and shaker screens of the Western United Gas Coal Co. mine at Murphysboro. A Missouri Pacific switch engine was switching the mine when cars broke loose from the engine and crashed into the tippie, making extensive repairs necessary. The work of repairing the broken and damaged parts of the tippie has been started by the railroad but will require several weeks to complete. The mine was formerly known as the "Gus Blair" mine.

Practically the entire jury has been chosen for the second trial at Marion, Ill., of men indicted for playing leading parts in the Herrin massacre of June 22. The majority of the men already seated are farmers, but at least one is a member of the United Mine Workers of America and has been paying into the union defense fund. However, this man declares he can pass impartial judgment upon the case and sees no reason why he cannot go back to work as a union miner in case the jury were to vote unanimously for conviction. No date has yet been set for the opening arguments, but they are expected to start within a few days.

INDIANA

Fire of unknown origin recently did \$20,000 damage to the mine tippie of the old Freeman mine at Bicknell, now known as the Howe-Coulter Mine No. 2. Thirteen men who were at the bottom of the mine at the time of the fire escaped uninjured. The plant employs about 300 miners. Firemen from Bicknell saved the engine house and equipment. The principal stockholders in the company are William Howe, John Coulter and Robert McCleavy, all of Chicago, and the corporation was recently reorganized. The mine was formerly operated by the Tecumseh Coal Co. and produces Fifth Vein coal.

Articles of incorporation have been filed with the Secretary of State for the Burr Coal Mining Co., an organization composed of Sullivan capitalists. The company is incorporated for \$50,000 and has purchased the Black Comet Mine, in Sullivan County. Heber Stevens, Frank Bolt, Harry C. Boothe and others are interested in the company. The officers of the company will be located in Sullivan. The Black Comet property is east of the city and always has been regarded as one of the best of the small mines in that field. Many improvements have been planned and the mine will be enlarged and modernized.

The H. & K. Coal Sales Co. has been organized at Elkhart, with a capital stock of \$15,000 for the purpose of doing a wholesale and retail coal business. The organizers are Robert R. Haggerty, Harry F. Kitchell and Ethel F. Arnold.

The washhouse at the Dixie Bee mine, near Pimento, was destroyed by fire recently, the miners losing practically all the clothing they had worn to the mine that day. It is believed a thief robbed the washhouse and set fire to it to escape detection of the theft.

KENTUCKY

W. F. Bradshaw, coal operator, banker, insurance man, and president of the Tobacco pool of western Kentucky, may be a candidate for Governor of the state, according to press reports.

P. Wooldridge, of Pewee Valley; C. F. Wooldridge, of Louisville, and others have incorporated the Falls Branch Coal Co., at Louisville, Ky., with a capital of \$70,000.

The Ajax Coal Co., of Bulan, Ky., is planning the construction of a coal bin at

a cost of \$10,000, which is to be modern in every respect.

The mines of the Consolidation Coal Co. at Jenkins were able to resume shipment of coal during the latter part of February after being out of commission for several days owing to a landslide which buried the tracks of the Sandy Valley & Elkhorn R.R. to a depth of 30 ft. for about 800 ft.

Activities of the Good Roads Committee of the Northeast Kentucky Association have resulted in assurances by the State Highway Commission of Kentucky that a hard-surface highway will be constructed through the northeastern Kentucky region and that work will be started without delay. This will provide increased transportation facilities and afford a short-route highway linking the entire South with the territory north of the Ohio River.

With a capital of \$15,000, the Kentucky Coal Sales Co., Williamsburg, has been chartered by B. F. Sheely, T. J. Roberts and A. M. Ellison.

The Kentucky Block Coal Co., of Paducah, capital \$100,000, has been chartered by W. F. Bradshaw, H. L. Richardson and C. F. Richardson. The interests recently took over the two mines of the Coll Coal Co., Madisonville. The Richardsons are active in the management of the big West Kentucky Coal Co., one of the largest in western Kentucky, which operates a fleet of river boats and eleven tippie mines. Bradshaw is a capitalist, tobacco and insurance man.

The Kentucky Co-operative Coal Co., Lexington, has been chartered with a capital of \$30,000, by C. C. Perry, of Quicksand, and C. R. Taylor and E. C. Brown, of Lexington.

Utility consumption of coal at Louisville may be reduced materially if plans now under development are completed for a big hydro power plant at the Ohio Falls, Louisville, this plant to be supplemented during low-water periods with current from the plant of the Louisville Gas & Electric Co., a Byllesby organization. The city and the company have been fighting to obtain first rights to the water power, the city intervening when it discovered that the company had plans of utilizing the river, no one else having ever before considered the plan as feasible.

Articles of incorporation have been filed at Lexington for the Ace Coal Co., capital \$25,000, T. F. McConnell, R. J. Raymond, Lexington, and A. B. Ewen, Whitesburg. The company plans mine operation in Letcher County.

Operators of the state met in Louisville on Feb. 9 with officials of the Louisville & Nashville R.R. in connection with a new plan for increasing coal mine capacities, so that some mines will not be getting a larger percentage of cars than they are entitled to. Not much was accomplished at this meeting, due to the fact that the Harlan and Hazard operators were not ready, and didn't have necessary figures available. Western Kentucky operators and those of the Southern Appalachian and Alabama districts fed by the L. & N. were represented. Another meeting was to be held late in February, at which figures were to be compiled and placed in shape for presentation before the Interstate Commerce Commission.

MINNESOTA

An incorrect report from Washington suggests that the hearing before the Interstate Commerce Commission on the complaint of the dock interests will bring a claim on behalf of the dock trade for increasing the rate on competing all-rail coal which comes into the Twin Cities. The complaint sets forth that the commission has established a tariff of \$1.82 for the 150-mile haul from the docks to the Twin Cities, which the railroads must charge, and that the roads have voluntarily made a rate of \$3.42 for all-rail coal hauled a distance of 642 miles. The complaint sets forth that the difference in the two sets of rates is discriminatory to the dock business and asks to have the discrimination removed. It leaves the method of correction with the commission, and does not suggest anything.

A conference of coal dealers was held in Minneapolis Feb. 13 to consider the bill for licensing coal dealers proposed by Fuel Commissioner Ivan Bowen. Mr. Bowen outlined his proposition and there was considerable discussion upon it. Resolutions were passed that there should be no regulation of the coal business undertaken until such time as it is shown to be necessary by the state; that it is not possible for the state to regulate the coal business; and that no regulation should be attempted until the federal coal commission has reported, so that the state proposition may be in harmony therewith.

MISSOURI

T. T. Brewster, president of the St. Louis & O'Fallon Coal Co., St. Louis, attended the sessions of the New York section of the American Institute of Mining and Metallurgical Engineers held in New York City last week.

Fire at the mine of the Blackfoot Coal Co., near Columbia, did considerable damage, the building containing the fan and the motor being destroyed. It made it necessary to stop operations and threw a large number of miners out of work. The plant was working at capacity at the time of the fire because of the sudden cold spell that had come up in Missouri just at the time.

Charles H. Swift, of Lafayette County, formerly surveyor for the Western Coal & Mining Co. and formerly with the engineering department of the City of Colorado Springs, Colo., has been appointed county highway engineer for Saline County, with headquarters in Marshall.

Articles of incorporation have been filed in the office of Secretary of State Charles U. Becker by the D-H Coal Co., Kansas City; capital, \$250,000 and 2,500 shares no par value. Incorporators, J. W. Alder, H. A. Fowler, J. E. Yount, T. N. Kingsley, L. S. Harper and F. C. D. Dobson.

Everton and Ash Grove capitalists have formed an organization for the development of the coal resources in that section of Dade County. The development will be a resumption of operations that were carried on some years ago when the Frisco R.R. was built from Springfield to Ft. Scott. At that time a good grade of coal was mined through shallow mining on the right of way just east of Everton.

Contests under the auspices of the Missouri Mine Safety Association will be held at Jackson, Mo., Huntsville, Higbee and Moberly in keeping with a resumption of the program of rescue work by this association, after a year of inactivity. Suspension of the work was due to the cessation of mining operations all over the country. Notices that these educational meetings are to be held all over Missouri are being sent out by President H. J. Pierce and Secretary George Hepple. Representatives of the Bureau of Mines are now in Missouri and plans for an itinerary have been made out. The co-operation of operators and miners is asked in the campaign in Missouri and all mines are urged to send teams to the cities in which the contests will be held.

NEW YORK

Sixty families in Sidney without coal called a mass meeting Feb. 21 and seized a carload of coal passing over the Delaware & Hudson R.R. destined for Lawrence, Mass. When informed of the acuteness of the situation, officials of the road diverted two cars to Sidney, one consigned to Albany and one to Bloomingdale. These and another car were placed in Sidney yards before nightfall. At the meeting a resolution was passed empowering the Village Board and Board of Health to seize coal cars passing through Sidney, if additional cars were not placed without delay.

Railroads would be prohibited from establishing embargoes on shipments of coal or other necessities of life or from refusing to receive such shipments for transportation by the provisions of a bill introduced in the Legislature Feb. 21 by Senator Ferris of Ticonderoga. The measure provides a new section for the Public Service Commission law. Senator Ferris has been active for the last few weeks in endeavoring to provide relief for counties without coal throughout the northern part of the state.

Charles S. Allen, formerly secretary of the Wholesale Coal Trade Association of New York City and more recently acting as secretary of the Tonnage Debtors' and Creditors' Committee of the new Tidewater Coal Exchange, has joined the sales force of Cory Mann George Corporation. In addition to the duties of the new connection Mr. Allen will continue to handle the settlements of the Debtors' and Creditors' Committee until that matter is closed.

During January the New York Central Lines had 66,021 cars loaded with bituminous coal on the lines of its system, exceeding the loading of that month one year ago by 53 per cent, the excess of January, 1923, over 1922 being 23,048 carloads. There were 49,607 cars loaded with that class of coal in January, 1922. January coal loadings were greater than the loadings for any January since loading records have been kept. The figures as to coal do not include cars of coal received from connecting carriers, which would bring total coal business to a much higher figure.

The Girtanner Engineering Corporation, now a subsidiary of the American Brake

Shoe & Foundry Co., will enlarge its activities of manufacturing and installing standardized steam ash and soot removal systems and other boiler house equipment. Offices have been removed to 30 Church Street, New York City, and agencies are to be established in all of the leading cities.

J. D. Monie, vice-president in charge of operations of the Titan Fuel Co., with office at Johnstown, Pa., will be located at the New York office of the company, No. 42 Broadway, for a couple of months beginning March 1.

F. R. Walters, formerly with the Alden Coal Co., has joined the forces of the Majestic Coal Co., of 120 Broadway, New York City. He will look after the trade on Long Island and Staten Island. The Majestic Coal Co. has opened an office at Somerset, Pa., with E. J. Frauenheim, Jr., in charge.

NORTH DAKOTA

Representatives of the Canadian government have been conducting tests of lignite at Grand Forks with a representative of the United States Government. The Canadian lignite is being tested to determine whether it may be used with the same result as the North Dakota lignite.

OHIO

The American Export & Inland Coal Co., Cincinnati, has been chartered with an authorized capital of \$100,000 to mine and sell coal. The incorporators are E. F. Heasley, Stuart R. Ducker, M. Wellman, R. Johnson and Arthur W. Gordon.

The Merrimac Fuel Co., Cincinnati, has been chartered by H. E. Joseph, W. J. Quinn, Ray E. Manley, Mary Barrett and Fanny Sachs, with a capital of \$50,000 to deal in coal and coal lands.

The Slater Coal & Supply Co., Lorain, has been chartered by George L. Slater, F. J. McFadden, D. A. Cook, S. S. McFadden and Mayme J. Ambrozio, with a capital of \$50,000 to deal in coal.

The Burns Coal Co., of Columbus, recently chartered with an authorized capital of \$100,000, will take over three additional retail yards in Columbus about April 1, making a chain of four yards. All of the yards will be equipped with modern machinery for loading and unloading. Edward C. Sharnaker is president and general manager.

Lee Hall, who has been president of the Ohio division of the United Mine Workers of America, was re-elected to that position during the annual convention held in Columbus. The convention also went on record as favoring an old age pension law. William Roy was re-elected vice-president and G. W. Savage, secretary-treasurer.

The American Export & Inland Coal Co. has been incorporated under the Ohio laws with \$100,000 capitalization in the place of the American Export & Inland Corporation, a West Virginia company. Ernest Heasley continues as president, with H. H. Randolph, of Williamson, W. Va., as treasurer, and L. N. Birk, of East Bernstadt, Ky., as secretary. The former company is the one that figured largely in the Ford deal that caused so much comment in September. The new company will represent some seventeen mines in the Big Sandy district as their direct mine representatives. Most of them were involved in subsequent happenings that tied up some of the payments for the coal that was shipped.

PENNSYLVANIA

The Lehigh Coal & Navigation Co. reports for the year ended Dec. 31, 1922, a decrease in both gross and net earnings, as compared with the year previous. The statement showed revenues of \$18,786,431, against \$22,801,906 in 1921, and net revenue after depreciation and depletion of \$3,788,207, against \$5,394,224. After allowing for other deductions there was a net income of \$1,587,024, equal to \$2.71 a share on the \$29,243,400 capital stock of \$50 par value. This compares with a net of \$3,033,764, or \$5.20 a share, in 1921.

Representative Thomas F. O'Boyle, of Lackawanna, it is announced, is having a bill prepared for introduction into the State Legislature to compel coal companies to sell coal to the general public in the municipality in which the mining is being done.

The United Mine Workers of America will try to have the present anthracite miners' certificate law extended to the bituminous mining fields. This action was decided on at a recent meeting of the anthracite tri-district board held in Wilkes-Barre. The board also decided to fight for the repeal of the anthracite tax law recently upheld by the U. S. Supreme Court.

On Feb. 1 American railroads were awaiting delivery of new rolling stock estimated to cost about \$325,000,000, according to reports filed by the carriers with the American Railway Association at Washington, Feb. 21. On Feb. 1 unfilled orders totaled 91,354 cars and 1,507 locomotives, of which 23,022 cars and 62 locomotives were ordered during January. The equipment under order was classified as follows: Coal cars, 37,476; box cars, 43,211; refrigerator cars, 6,402; freight locomotives, 1,022; passenger locomotives, 362, and switching engines, 123.

The fifth anthracite district in 1922 produced 866,450 tons, while in 1921 output was 2,056,299 tons, a decrease of 1,189,849 tons, says the report of S. J. Phillips, mine inspector. This was due to the strike. There are 12 collieries and 30 mines in the district, while the mines in operation, the report says, number 24. Of the tonnage produced 827,662 tons were shipped to market, the balance being sold to the local trade and used for steam and heat at the mines. Electrical machines produced 40,810 tons.

Edgar C. Weichel, of Scranton, who for the past twenty years has been a traveling inspector for the Pennsylvania Coal Co. has become an assistant mining engineer for the Hudson Coal Co.

A report on strikes in Pennsylvania during 1922 just made by William J. Tracy, chief of the Bureau of Mediation and Arbitration of the State Department of Labor and Industry, to acting Commissioner Walker of that department shows that the coal strikes in the anthracite and the bituminous districts of the state last year involved 322,806 men. The anthracite mines were idle for 132½ days and the bituminous mines for 106 days. Tracy estimated the number of days lost to the strikers in both fields at 38,000,000 days and the wages lost at \$190,000,000. He based the financial loss to the workers on an average daily wage of \$5. Involved in the strikes were 1,263 mines.

Shipments of anthracite in January, as reported to the Anthracite Bureau of Information, Philadelphia, amounted to 6,671,822 gross tons, as compared with 4,848,053 gross tons during the corresponding month last year, an increase of 1,823,769 tons, or 37.6 per cent. January of this year also showed an increase of 216,946 tons over the preceding month of December, when 6,454,876 tons were shipped to market. Shipments by originating carriers were as follows, in gross tons:

	January 1923	December 1922
Phila. & Rdg.	1,381,359	1,259,927
Lehigh Valley	1,093,052	1,107,745
Jersey Central.	588,093	564,071
Lackawanna	1,038,719	938,530
Delaware & Hudson.	741,739	832,893
Pennsylvania	596,989	561,603
Erie	750,277	738,073
N. Y., O. & W.	178,072	159,829
L. & N. E.	303,522	292,205
Totals	6,671,822	6,454,876

For the purpose of bringing all the mining men of the Centre-Clearfield region together to discuss the problems before them, a meeting was held Feb. 3 in Phillipsburg, at which time an organization to be known as the Moshannon Coal Mining Institute was formed. There were present forty-eight mining men representing twenty-six coal companies from the towns of Clearfield, Curwensville, Woodland, Morrisdale, Munson, Winburne, Grassflat, Phillipsburg, Osceola Mills, Houtzdale, McCartney, Sandy Ridge, Tyrone and Johnstown, as well as representatives from several mine supplies companies. After organization, it was decided to make a further effort to have all the interested men in the region present at the next meeting, the time and place, as well as the nature of which to be decided upon by the executive committee. C. B. Maxwell was elected president; Thos. A. Mather, first vice-president; James L. Lewis, second vice-president; George H. Brighton, third vice-president; Thomas F. Morgan, secretary-treasurer; James W. George, assistant secretary-treasurer, and the executive committee as follows: Joseph Knapper, D. L. Boyle, H. S. Shillingford, William George, Fred Pepper.

The assessed valuation of the coal beneath the surface within the city limits of Wilkes-Barre for the year 1922 was \$21,633,079, from which will be deducted \$317,254, abatements for coal mined during the year leaving the valuation for 1923, \$21,315,824, on which the city hopes to receive as taxes \$213,158.24.

S. M. Casterline, who for many years has represented the Fairmont Mining Machinery Co. has been made sales manager of the American Mine Equipment Co., Pittsburgh.

Under the provisions of a bill introduced in the House by John E. Stavitski, of Luzerne County, the owner of a mine or an operator who neglects or refuses to furnish a sufficient supply of pure drinking water for the use of employees in the mines is liable to a penalty of \$50 for each day of such neglect.

Local Union No. 5256, United Mine Workers of America at Jerome, Somerset County, at a recent meeting decided in favor of continuing the strike, thus indorsing the action of the district board and officers of District No. 2 in ordering a referendum vote.

A committee of the Central Pennsylvania Coal Producers' Association held a conference in Altoona recently to formulate car-distribution and mine-rating rules. This meeting was held in response to a request from the Interstate Commerce Commission, which asked the operators and the Pennsylvania R.R. to agree on rules. The conference was attended by President B. M. Clark, of Indiana; Vice-President G. Webb Shillingford, Secretary Charles O'Neill and Commissioners John C. Forsythe, J. William Wetter, Leslie Wallace, Mr. McDougall, A. H. Wilson and E. W. Derringer. This committee will meet with a committee of the railroad company later. The rating which a mine receives depends upon its capacity per day and the car distribution, must be determined when the car supply is less than 100 per cent. There has been much complaint on the part of the operators relative to the distribution of cars, the claim being made that it is inequitable. Production in the district is far below the standard.

UTAH

John Crawford, state mining inspector, has issued a warning to coal mining superintendents and foremen in which he says none but authorized shotfirers must fire blasts. Mr. Crawford called attention to the recent deaths from this cause and says prosecution will follow if the rule of the Industrial Commission in this respect is not adhered to.

A bill to amend Section 3932 of the compiled laws of Utah, 1917, relating to check weighmen in coal mines has been introduced in the Legislature. It would compel operators to deduct pro rata from the pay of miners and pay the check weighman at the same time the miners are paid.

The MacLean Coal Co. has been incorporated for \$500,000. The new company owns 2,000 acres of coal lands in Spring Canyon, Carbon County, known as the MacLean mine. Incorporators are: W. D. MacLean, W. M. MacLean, L. B. McCormick, J. J. Welch and G. S. Payne. W. D. MacLean is general sales agent for the Standard Coal Co., Kearns Building, Salt Lake City.

VIRGINIA

A coaling station for barges and small vessels, costing in the neighborhood of half a million dollars, is being promoted to be established on the waterfront in Berkeley, on the south side of Norfolk. Capital in Philadelphia and Norfolk is to be employed in the project, according to the best information obtainable.

D. A. Butler, Norfolk manager for the Fort Dearborn Coal Co., has resigned that position to return to the accounting business, in which he was formerly engaged. He will open an office in Norfolk.

The Virginia Coaling Corporation, at Norfolk, has increased its capital to \$25,000.

The Eastern Coal & Export Corp., of which L. S. Evans is president, and which is located at Richmond, has increased its capital stock from \$500,000 to \$750,000.

WEST VIRGINIA

A special meeting of directors of the Pond Creek Coal Co., has been called for March 1 in New York to discuss dissolution and liquidation of the company. The property was recently sold to Henry Ford. It is reported that the directors will declare a final liquidation dividend of \$10 a share. This dividend, when declared, will bring the total payment to \$45 a share. Ford paid \$8,500,000 for the entire property and equipment of the company, which, with current assets, was equal to \$45 a share on 212,920 outstanding shares of stock after payment of taxes and all liquidation expenses. A first dividend of \$35 a share was declared Feb. 15.

The Pound Mountain Coal Co. has been incorporated at Huntington with a capital of \$100,000; John R. Evans, C. W. Campbell and E. D. Campbell are the incorporators.

G. D. Miller, Frank Enslow and R. H. Cunningham have organized the Basic Coal Co. at Huntington.

Charleston capitalists are said to be largely interested in the Flynn Coal & Coke Co., recently organized with a capital of \$50,000 to develop Fayette County coal properties. Among those interested are Daniel K. Flynn, of Elmo; H. B. Beury, James Flynn, A. S. Guthrie and J. A. Flynn, all of Charleston.

A new corporation has been formed by the interests back of the Pond Creek Coal Co., which recently disposed of its coal properties in Kentucky to Henry Ford. It will be known as the Pond Creek Pocahontas Co. and will operate in the Pocahontas field in West Virginia. The company has acquired mines with an annual tonnage of about 750,000, or about 150,000 tons less than the current tonnage rate of the Pond Creek Coal Co. The capitalization of the new company consists of 125,000 shares of no par value common stock. F. B. Davis, president of the Pond Creek and Island Creek companies, is president of the new corporation. The directors are Ben P. Bole, J. A. Downs, I. D. Francis, Frederick H. Goff, Charles G. Rice, Galen L. Stone and Mr. Davis.

The County Court of Monongalia County, W. Va., has instituted action to set aside the sale of bonds of the Wheeling & Morgantown Ry. to Samuel Pursglove of Cleveland, receiver of the road, the sale having been authorized by the county court last year. Since then the personnel of the court has been changed. In taking such action the new county court instructed the prosecuting attorney of Monongalia County to unite with counsel for the plaintiff in the case of R. H. Jarvis et al. against Samuel Pursglove. The bonds of the railroad, owned by the county, were sold for the sum of \$162,500, the face value of the bonds being \$325,000, plus accrued interest.

Henry Ford may extend the Detroit, Toledo & Ironton R.R. into the coal fields of West Virginia, according to assertions made by him Feb. 17 at Williamson, W. Va. His road now runs within 80 miles of Williamson. "We could haul coal to Detroit, make the product into coke, and sell it at a reasonable figure," he said. "If plans for the extension go through, the entire line would be electrified," he said. "We would develop the Ohio River just as we plan to develop Muscle Shoals," said Mr. Ford, "using hydroelectric power to move our trains and for other industries." He declared that he is now selling coke at \$8 a ton in Detroit, and making a profit.

The E. E. White Coal Co. is planning to initiate work on the new steel tippie at its Glen White plant about April 1 with a view to having the tippie ready for operation by Sept. 1. The tippie will differ from the ordinary tippie in that only run-of-mine will be loaded over it and yet the degree of preparation and cleaning will be such as to meet the requirements of the most exacting market, it is stated. Other improvements are contemplated for the Glen White plant, all with a view to keeping the plant up to its degree of efficiency.

New coal companies organized in West Virginia during January had an aggregate capitalization of \$6,850,000, there being 27 coal concerns in all formed during the period mentioned, two of which were non-resident. As two of the coal companies organized have capital stock without par value, the combined capitalization actually is in excess of the figures given. The largest among the coal companies organized was the Mountain State Coal & Gas Syndicate with a capital stock of \$2,000,000. Other companies organized were as follows: The Katona Coal Co., 1,000 shares without par value; Bar-Jay Coal Co., of Philippi, \$150,000; Edna Gas Coal Co., of Fairmont, \$1,500,000; Faith Smokeless Coal Co., of Beckley, \$200,000; Fairview Coal Co., of Webster Springs, \$50,000; Norwood Coal Co., of Omar, \$1,000,000; Pond Mountain Coal Co., Huntington, \$100,000; Profets Coal Co., Fairmont, \$10,000; Basic Coal Co., Huntington, 7,400 shares without par value; Glenbar Coal Co., Clarksburg, \$100,000; Rich Mountain Sewell Coal Co., of Elkins, \$75,000; Shady Fuel Co., of Oxley, \$25,000; McKone Coal Co., of Tunnelton, \$200,000; Morganette Coal Co., of Beckley, \$400,000; Number One Coal Co., of Grafton, \$5,000; Hutton-Beale Coal Co., of Fairmont, \$50,000; Black Ash Coal Co., of Beckley, \$15,000; Riverside Coal Co., of Morgantown, \$150,000; Ideal Coal Co., of Charleston, \$150,000; Jackson Run Coal Co., of Clarksburg, \$60,000; Erwin Black Coal Co., of Charleston, \$150,000; Fire Creek Pocahontas Fuel Co., of Huntington, \$150,000; Flynn Coal & Coke Co., of Sunny Side, \$50,000; Coe Pocahontas Coal Co., of Covel, \$200,000; Brownsdale Coal Co., of East Liverpool, Ohio, \$50,000; Sanders Run Coal Co., of Pittsburgh, Pa., \$10,000.

The following West Virginia coal companies have increased their capital stock in the amounts given: Coal River Collieries Co., of Huntington, from \$200,000 to \$250,000; Gulf Smokeless Coal Co., from \$200,000 to \$3,000,000; Logan Fuel Co., from \$25,000 to \$100,000; Independent Coal Co., from \$50,000 to \$100,000; National Coal Mining Co., from \$50,000 to \$150,000.

Despite conflicting reports it is stated in reliable quarters that there has been a settlement of the claim of the Willis Branch Coal Co. against the United Mine Workers and that the sum paid over to the coal company was \$400,000. John L. Lewis, International president of the United Mine Workers, has denied any such settlement.

Roy H. Cunningham and others prominent in the coal trade of southern West Virginia have organized the Piedmont Coal Co., the capital stock of which consists of 20,000 shares without par value. Associated with Mr. Cunningham in the new venture are C. W. Strickland, G. C. Garred, James E. Hart and E. E. Winters, Jr., all of Huntington, where the general offices of the company are to be located.

Five men were injured, one seriously, in an explosion Feb. 19 at No. 7 mine of the Island Creek Coal Co., Holden. Mine-rescue crews were reported searching Feb. 20 for two miners that were missing. According to mine officials, the explosion resulted when a car was derailed, filling the shaft with dust.

The new dry-process coal cleaning plant at the Crane Creek mine of the American Coal Co., near McComas, was completed late in February and was scheduled to have its test run at once.

A news item in *Coal Age* Dec. 28, 1922, stating that a fire due to spontaneous combustion threatened the destruction of a 35,000-ton storage pile of coal belonging to the Amherst Coal Co., at Amherstdale, W. Va., was a mistake. The Amherst company states that while it maintains "large stores of coal, this storage has never even been threatened with spontaneous combustion, even though one of the piles remained intact from December, 1920, to July, 1922, a period of eighteen months."

CANADA

In the year ended Jan. 31 the United States sent to Canada 2,676,036 tons of anthracite, duty free, valued at \$23,364,938, and 10,327,450 tons of bituminous coal, valued at \$37,578,581, on which duty of \$4,680,116 was paid, Secretary of State Copp announced Feb. 21 in the House of Commons at Ottawa.

During the week after the explosion of Feb. 8 which killed 33 men at the Canadian Collieries No. 4 mine, at Cumberland, Vancouver Island, a mass meeting of miners was held when the following resolutions were passed: "That the exclusion of Orientals from all mines be demanded. (2) That the longwall system of operating mines be eliminated. (3) That the meeting condemn Mr. Menzies, member of the Provincial Legislature for the district, for the statement alleged to have been made by him during the last session of the Legislature, to the effect that the miners and the company were satisfied with the result of the investigation into the cause of the previous explosion and with conditions at the mine." Trade unions in Vancouver threaten to boycott dealers that sell coal produced at mines where Oriental labor is employed. The Provincial Government has donated \$5,000 toward the relief of the sufferers from the explosion and public subscriptions have been started in the cities of Vancouver and Victoria.

WASHINGTON

The War Department has called for bids for 2,000 tons of run-of-mine coal for delivery at Chanute Field, Ill. 324 tons of lump for use at Fort Omaha, Neb., and 100 tons of lump for use at Scott Field, Ill. Bids were scheduled to have been opened Feb. 27 at the Chicago Depot of the War Department.

Traffic News

F. R. Wadleigh, Federal Fuel Distributor, has asked the Interstate Commerce Commission to withdraw Service Order 38, under which the Montevallo Mining Co. of Aldrich, Ala., receives during the present coal shortage priority rights to the use of 300 coal cars over its regular allotment.

The I. C. C. has authorized rail and barge rates and joint rates on coal from Alabama coal fields to Mobile and New Orleans for export.

The New York Central R.R. coal traffic department on Feb. 23 issued Supplement No. 10 to Summary of informal embargo notices No. 4, as follows: On account of accumulation embargo 298 is placed by the New York Central R.R. against all freight for delivery to the Fonda, Johnstown & Gloversville R.R. except perishable freight and anthracite coal, also bituminous coal when covered by permit issued by J. N. Snider, coal traffic manager, New York City.

To prevent congestion embargo 303 was placed Feb. 21 by the New York, Ontario & Western Ry., effective at once, against all shipments of coal from connecting lines (by rail or flat) at Weehawken, N. J., also New York and Brooklyn stations, piers or terminals; no exceptions.

The embargo placed by the Erie R.R. against all shipments of coal for the Passaic Worsteds & Spinning Co., Dundee, N. J., has been entirely cancelled.

To prevent accumulation the New York Central R.R. on Feb. 22 issued embargo 305 against all carload and less than carload freight destined to points on or via the New York, New Haven & Hartford R.R. and Central New England Ry., except livestock, perishable freight, anthracite coal, railroad fuel, freight consigned to officers of the United States Government. Shipments covered by permits issued by C. J. Brister, assistant vice president, Chicago, or G. C. Woodruff, general freight agent, New York City.

On account of accumulation the New York Central R.R. issued Feb. 22 embargo 230-A (superseding embargo 230), all carload and less than carload freight destined to points on or via the Boston & Maine R.R., except livestock, perishable freight, anthracite coal, railroad fuel and freight consigned to officers of the United States Government. Shipments covered by permits issued by C. J. Brister, assistant vice president, Chicago, or G. C. Woodruff, general freight agent, New York City.

At a conference of railroad officials representing the Virginian Ry. and coal operators shipping over that railway held in Charleston, W. Va., on Feb. 20, regulations governing the shipping of coal were presented by the railroad officials and agreed to by the operators, under the terms of which shippers are to receive an equitable rating to be determined by the loading capacity of the mines. Approximately 75 operators along the line of the Virginian are affected by the new rules and regulations, which become effective on March 1. The introductory period will be supervised by the allotment commission of the railroad and it is thought that with the new rules in effect there will be improved car distribution. Members of the allotment commission will visit the mines and under certain regulations will assist in arriving at a proper car apportionment basis. W. F. League will be chairman of the new commission, which is to have its headquarters at Princeton, W. Va.

A hearing will be held by the Coal and Coke Committee, Trunk Line Territory, in Room 401, 143 Liberty St., New York City, 2.30 p.m., Thursday, March 8, on a shippers' proposal for the establishment of rates on bituminous coal from the New River District of the Chesapeake & Ohio Ry. to Baltimore, Md., on the basis of \$3.65 per gross ton.

The preliminary income statement of the Delaware, Lackawanna & Western Railroad Co. indicates that the coal strike resulted in a falling off of \$11,355,000 in gross business for the year of 1922, as compared with the previous year. Net income amounted to \$10,475,928, against \$19,158,403 the year before.

Owing to the inability to get its cars back from other railroads, coal loadings of the Pittsburgh & West Virginia Ry. are now only 40 per cent of car requirements, Henry L. Farrell president of the company, says: "January net operating income will be favorable and will compare well with that of December," Mr. Farrell added.

Hearing on the joint petition of the Van Sweringen roads seeking permission to consolidate the New York, Chicago & St. Louis, the Chicago & State Line, the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville and the Toledo, St. Louis & Western roads into one system to be known as the New York, Chicago & St. Louis R.R. will take place at Buffalo on March 5. In New York only the "Nickel Plate" is involved, but similar applications are pending in other states and before the Interstate Commerce Commission. If ratified the new company also seeks to issue \$32,720,000 in new preferred stock and \$46,247,900 common stock. In the petition it is pointed out that the roads have been under common control for some time and that the consolidation would result in substantial economies and in improved service.

George S. Brackett, executive vice-president of the Northern West Virginia Coal Operators' Association, and several coal operators of northern West Virginia held a conference late in February in Pittsburgh with representatives of the Pennsylvania R.R. for the purpose of discussing mine ratings. A similar conference was held with representatives of the Baltimore & Ohio at the time the wage conference was held with officials of the United Mine Workers earlier in the month.

Another attempt is being made by the Federal Valley R.R., which is owned and operated by the same interests that conduct the Black Diamond coal mine at Lathrop, Ohio, to obtain relief from the Interstate Commerce Commission. The railroad, which is 16 miles in length, was purchased by the Black Diamond Co. for the sole purpose of transporting the output of its mine. Other shippers along the line of the railway filed a complaint with the Public Utilities Commission of Ohio and obtained an order making the line a common carrier of freight. This added greatly to the burden of operating the line, as all freight is hauled at a loss due to disadvantageous divisions with connecting lines. It is contended that under present conditions the confiscation of the property ultimately will result. Such divisions of joint rates are asked as will permit this short-line railroad to pay its operating expenses, taxes and a fair return on the value of the property.

Obituary

William Massie Warwick, superintendent of the operations of the Slab Fork Coal Co. in Raleigh County, W. Va., and for more than a quarter of a century prominent in the coal industry of southern West Virginia, died at his home at Slab Fork, on Feb. 8, of pneumonia. Mr. Warwick was 70 years of age.

Ora Darnall, 58, for many years connected with the Bolen-Darnall Coal Co. of Kansas City, Mo., died Feb. 10, in Battle Creek, Mich. Mr. Darnall in 1901 became general manager of the Bolen Coal Co. and not long afterward was made a partner in the concern. He moved from Kansas City to Wyoming twelve years ago.

James Mooney, widely known as an organizer for the United Mine Workers of America, who dropped dead recently in Kansas City, was buried in Novinger, Mo. Mooney had been a resident of Novinger and Connellsville for more than twenty years and had a wide acquaintance among miners not only in Missouri but throughout the United States and Canada, and he had been an organizer for this organization in both those countries for a number of years. He was attending a mine conference at the time of his death.

George Z. Hosack, treasurer of the Berger-Alken Coal Co., of Carnegie, Pa., died on Feb. 9, after an illness of more than a month. He was a former treasurer of Allegheny County, and during his time had been associated with many coal companies.

George R. Stagg, superintendent of the Lehigh Valley Coal Sales Co. pockets at Irvington, N. J., died on Feb. 14 from pneumonia and influenza. He lived in Irvington.

James Omer Cole, 94 years old, the surviving original member of the lumber and coal firm of Cole & Crane, of Cincinnati, Ohio, died at his home in Peru, Ind., on Feb. 3. Mr. Cole owned considerable virgin timber land underlaid with coal in West Virginia.

Judge Martin A. Knapp, of the Commerce Court, formerly chairman of the Interstate Commerce Commission and long prominently identified with transportation matters, died Feb. 10.

Association Activities

Pittsburgh Vein Operators' Association of Ohio

The annual meeting of the Pittsburgh Vein Operators' Association of Ohio, comprising operators in the eastern Ohio No. 8 field, was held in Cleveland, Ohio, on Monday, Feb. 19, at Hotel Cleveland. The following officers and members of the executive committee were elected for the ensuing year: President, Michael Gallagher (re-elected); vice-president, Ezra Van Horn; treasurer, H. R. Sullivan (re-elected); secretary, D. F. Hurd (re-elected). S. H. Robbins, president of the Youghiogheny & Ohio Coal Co., was chosen chairman of the meeting in the absence of President Gallagher, who was unable to attend on account

of the death of his mother. Colonel Henry L. Stimson and G. H. Dorr, of counsel for the bituminous operators' special committee, Washington, D. C., addressed the morning session, which had been especially arranged for the purpose of acquainting eastern Ohio operators with the progress being made by the national committee in preparing and presenting material facts concerning the industry before the U. S. Coal Commission. Non-member operators in the District were present as guests of the association at the morning session and also at the luncheon which followed.

Preferences in the handling of privately-owned coal cars are condemned vigorously by S. C. Higgins, traffic manager for the New River Coal Operators' Association in a written argument filed with the Interstate Commerce Commission, in connection with the assigned-car case. "It is not in the public interest," Mr. Higgins says, "to give preference in the handling of private cars during the stress of car shortage, thus depriving shippers customarily dependent on system coal cars from distributing generally the products of the mines and using the limited facilities of the carrier in the movement of private coal cars, thereby disposing of the product in a restricted area." Mr. Higgins pointed out in his argument that during the car shortage on the Chesapeake & Ohio private cars are being placed at private-car mines greatly in excess of the distributive share placed at system mines. He further contends that both empty and loaded private cars receive preferential movement. Nelson W. Proctor, attorney for the Louisville & Nashville Ry., in taking exception to the contentions of the Commercial Coal Co. in the matter of rates on coal from eastern Kentucky mines to Northern and Western cities, declares that the mine operators have not shown these rates to be unreasonable. He says the present differences between the rates from L. & N. group 4 stations and group 3 stations are justified by the differences in distance and by comparison with the differentials obtaining between other coal groups. He declares that the grouping of mines in eastern Kentucky represents the best judgment of the traffic officers of the company and he states that the mine operators have not established that they are subjected to any unreasonable disadvantage as compared with the operators in group No. 3, who are nearer the markets.

Coming Meetings

International Chamber of Commerce will hold its second general meeting in Rome, Italy, March 19-26.

American Society for Testing Materials will hold its annual meeting at the Chalfonte-Haddon Hall Hotel, Atlantic City, N. J., beginning June 25 and continuing throughout the week. Secretary, E. Marburg, Philadelphia, Pa.

The Colorado & New Mexico Coal Operators' Association will hold its annual meeting June 20 at Denver, Col. Secretary, F. O. Sandstrom, Denver, Col.

Northwestern Pennsylvania Coal Operators' Association will hold its annual meeting March 6 at the William Penn Hotel, Pittsburgh, Pa. Secretary, T. F. Diefenderfer, Butler, Pa.

Canadian Institute of Mining and Metallurgy's annual meeting will be held March 7, 8 and 9 at the Mount Royal Hotel, Montreal, Quebec, Canada. Secretary, George C. Mackenzie, Montreal, Quebec, Canada.

The Electric Power Club's annual meeting will be held at the Homestead, Hot Springs, Va., Dec. 11-14. Executive secretary, S. N. Clark, Cleveland, Ohio.

Indiana Bituminous Coal Operators' Association will hold its annual meeting March 14 at Terre Haute, Ind. Secretary, F. H. Penna, Terre Haute, Ind.

National Foreign Trade Council will hold its annual conference May 2-4 at New Orleans, La. Secretary, O. K. Davis, 1 Hanover Square, New York City.

The executive board of the Coal Mining Institute of America will meet in Pittsburgh, Pa., Saturday, March 3.

The Gas and Fuel Section of the American Chemical Society is arranging a second sectional meeting at the New Haven meeting of the American Chemical Society during the first week in April. The section program will consist of papers on gas and fuel chemistry and a symposium on motor fuels, held jointly with the petroleum division.

The eleventh annual meeting of the Chamber of Commerce of the United States will be held in New York City May 7-10.